MONTHLY WEATHER REVIEW.

Editor: Prof. Cleveland Abbe.

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INTRODUCTION.

The Monthly Weather Review for September, 1903, is based on data from about 3300 stations, classified as follows:

Weather Bureau stations, regular, telegraph and mail, 160; West Indian Service, cable and mail, 8; River and Flood Service, 52, river and rainfall, 177, rainfall only, 62; voluntary observers, domestic and foreign, 2565; total Weather Bureau Service, 2962; Canadian Meteorological Service, by telegraph and mail, 20, by mail only, 13; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 75; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25; The New Panama Canal Company, 5; Central Meteorological Observatory of Mexico, 20 station summaries, also printed daily bulletins and charts, based on simultaneous observations at about 40 stations; Mexican Federal Telegraph Service, printed daily charts, based on about 30 stations.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Territorial Meteorologist, Honolulu, H. I.; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander W. H. H. Southerland, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; Rev. Josef Algué, S. J., Director, Philippine Weather Service; and H. H. Cousins, Chemist, in charge of the Jamaica Weather Office.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the Review, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or $10^h\ 30^m$ west of Greenwich. The Costa Rican standard of time is that of San José, $0^h\ 36^m\ 13^s$ slower than seventy-fifth meridian time, corresponding to $5^h\ 36^m$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. Garriott, in charge of Forecast Division.

Two storms of marked intensity advanced from the subtropical region north of the West Indies to the Atlantic coast of the United States during the second decade of the month.

The regular morning reports of the 10th indicated the presence of a disturbance over the eastern Bahamas. By the evening of the 10th the center of disturbance had advanced to the vicinity of Nassau, New Providence Island, Bahamas, where a minimum barometer reading of 29.20 inches was reported at 7 p. m. Between 6 and 7 p. m. the wind at Nassau increased from an easterly direction to 60 miles an hour, when the anemometer cups blew away. The wind then went to southerly and reached an estimated velocity of 90 miles an hour. On New Providence Island the fruit crop was destroyed and much damage was caused to small buildings. At Cat Cay, Bahamas, a minimum barometer reading of 28.82 inches was reported.

During the 11th the hurricane center approached the southern Florida coast. At Jupiter the barometer fell from 29.88, at 8 a. m., to 29.63, at 6 p. m., and the wind increased from the northeast to a velocity of 78 miles an hour at 6:45 p. m. For one minute the wind blew at a rate of 84 miles an hour. At 11 p. m. the direction of the wind changed to east and the velocity began to decrease. At 1 a. m. of the 12th the wind veered to southeast and increased to 60 miles an hour, and at 7 a. m. the gale ended. The center of the storm passed about 50 miles south of Jupiter, and the greatest amount of damage on the east Florida coast was caused in that region. The northern limit of destructive winds on the east coast was about 30 miles north of Jupiter. In the vicinity of Jupiter the losses were confined principally to pineapple sheds. From West Palm Beach to Miami the property loss amounted to about $100,000. Nine lives were lost in the stranding and breaking up of the British steamer *Inchulva* at Delray. The vessel and cargo are said to have been valued at $350,000. An oil barge was lost by a tug and blown on the beach at the lower end of Lake Worth; it was afterwards hauled off and the loss was estimated at $5000. The schooner *Martha T. Thomas*, loaded with lumber, was blown ashore near Jupiter, and if the efforts that were being made to save the cargo were successful the loss did not exceed $15,000.

During the 12th the storm center moved northeastward over the southern part of the Florida Peninsula and passed into the Gulf of Mexico. At Tampa the barometer fell from 29.68 at 8 a. m. to 29.42 at 1 p. m., and from 10:15 a. m. until after 2 p. m. the average wind velocity was about 40 miles an hour, with squalls at a rate of 50 to 60 miles an hour. In Tampa, buildings were destroyed or damaged to the extent of about $200,000, and in the surrounding country great havoc was caused to orange groves.

The center of disturbance crossed the extreme northeast part of the Gulf of Mexico during the 13th, and at 8 p. m. was located east of Pensacola. At St. Andrews the barometer

is reported as having fallen from 29.80 at 7 a. m. to 29.08 at 4:15 p. m., with northeast wind that increased in gusts to about 60 miles an hour. From 4:15 to 4:45 p. m. the barometer was stationary, and then rose slowly with wind going to southwest. The wind had been west from 3:30 to 4:45 p. m., and at 4 p. m. reached an estimated velocity of 75 to 80 miles an hour. The wind continued strong from the southwest until the morning of the 14th.

During the 15th and 16th this storm practically dissipated over the east Gulf and South Atlantic States.

The warnings and advices issued in connection with this storm permitted all possible precautions to save exposed property, and comparatively little damage was caused to vessels.

Mr. C. E. Garner, President of the Jacksonville Board of Trade, has written as follows regarding the warnings:

I wish to express my appreciation of the timely warnings given by the Weather Bureau both at this point and at Tampa during the recent West Indian hurricane. They were especially valuable at Tampa, as I have steamers operating from that point to Manatee River and Terre Cela Bay points, and the notice we had from the Weather Bureau prevented our leaving port on Saturday the 12th. The observer at Tampa kept us fully advised as to the situation there, and his warnings to vessels not to leave port, in my judgment, prevented serious disasters. I think it is very fortunate for the agricultural and shipping interests of this State that we have such an efficient service of the Weather Bureau, and that the service is in the hands of such capable and accommodating officials.

The Tampa Evening Herald of September 15 comments editorially regarding the storm, and says, in part:

Too much credit for the saving effected can not be given to the Weather Bureau, and it is the intention of this article to direct public attention seriously toward one of the most valuable of the Government branches in this city.

The Weather Bureau observer at Jacksonville, Fla., reports that there is no doubt but that a large amount of property and a number of lives were saved by the timely display of the storm warnings. Ten vessels, the approximate value of which was one-quarter of a million dollars, remained in port at Jacksonville during the displays, and three vessels, valued at $135,000, at Fernandina. Sponge and fishing vessels, valued at nearly $200,000 and employing hundreds of men, remained in ports along the Florida coast, and the display of warnings undoubtedly saved many of these vessels and their crews. The observers at Tampa and Pensacola gave the widest possible distribution to the warnings and state that they were, as usual, well heeded.

The origin of the severe storm that visited the middle Atlantic coast on the 16th is obscure; it is probable, however, that it advanced northwestward from the subtropical region south of Bermuda. Evening reports of the 15th showed the presence of a disturbance off the North Carolina coast, but did not clearly indicate its intensity and subsequent course. Advancing northward during the night of the 15th, the disturbance was central near the southern New Jersey coast on the morning of the 16th. During the 16th the center of disturbance moved northward along the New Jersey coast and divided, one part apparently passing up the Connecticut Valley and the other northwestward over New York. During this day recorded wind velocities of more than 60 miles an hour occurred along the New Jersey, New York, and southern New England coasts. Although the area of this storm was small, it caused the loss of a number of lives and considerable destruction of property and crops. On account of high winds along the middle and north Atlantic coasts, storm warnings that were ordered on the morning of the 16th were continued during the 17th.

During the 28th a severe storm recurved northeastward over Bermuda. At 8 a. m. the barometer at Hamilton was 29.82 inches with a moderate east wind and rain. At 10:40 a. m. 29.60 inches, and at 12:20 p. m. 29.20 inches. At 2:20 p. m. a reading of 29.18 inches was reported, with barometer rising rapidly. The wind, that had been increasing from northeast shifting to east, backed about 2 p. m. to northwest. The wind is reported to have attained hurricane force, uprooting trees, damaging houses, and destroying crops. The storm probably approached Bermuda from the east or southeast, or possibly it developed in the southern end of a trough of low barometric pressure that passed eastward from the middle and north Atlantic coasts of the United States during the night of the 27th. Its recurve northward near Bermuda was made on the eastern edge of an area of high barometric pressure that extended eastward from the Atlantic coast during the 28th. Moving northeastward from Bermuda this disturbance apparently united with an extensive area of low barometer that covered the British Isles during the closing days of September and the first week of October.

During the 10th and 11th a severe storm prevailed over the British Isles, the North Sea, and adjoining continental coasts, wrecking many vessels. During the 12th and 13th this storm passed eastward over continental Europe. From the 19th to the 21st a storm advanced from the ocean between the Azores and the coast of Portugal to the west coasts of the British Isles, where high but diminishing winds prevailed during the next two days.

The first storm of the month on the Great Lakes advanced from Kansas to the St. Lawrence Valley during the 9th and 10th. A storm that caused high winds over the western Lake region moved from Colorado to Manitoba during the 11th and 12th. A disturbance of moderate strength occupied the eastern Lake region during the 16th and 17th, and a storm of marked intensity moved eastward over the Great Lakes during the 25th, 26th, and 27th.

No severe general storms crossed the Pacific coast. On the 12th, 13th, and 23d high northwest winds occurred at coast points near San Francisco, Cal.

The month opened with prevailing dry weather in the interior of the Gulf and South Atlantic States, Tennessee, and Kentucky. On the 9th rain relieved to some extent the drought conditions in central Texas, and rains from the 13th to 15th broke the dry period in the eastern part of the cotton belt.

Frost occurred in the Northwestern States on the 4th and 5th, and in northwestern Ohio on the 6th. From the 14th to the 16th frost was reported in the corn belt as far south as northern Kansas, extreme northwestern Missouri, southern Iowa, and northern Illinois, and injury to corn, mostly in the lowlands, was reported in the Dakotas, Nebraska, and Minnesota. The occurrence of frost was, in each instance, announced in the forecasts.

Snow fell on the Continental Divide, Colorado, on the 7th, and at Butte, Mont., on the 8th. On the 15th heavy snow was reported in Wyoming.

During the second decade of the month flood stages were reached in the upper Mississippi River and tributaries.

BOSTON FORECAST DISTRICT.

Frosts during the second week of the month caused considerable damage, especially on lowlands. Storm warnings were displayed on the 15th, 16th, 18th, and 24th, and no storms occurred without warnings.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

Warnings were issued on the 10th for a storm that occurred on the 11th. The information received regarding the hurricane that crossed the eastern Gulf from the 12th to the 14th was greatly appreciated by shipping interests.

Warnings were issued for the first frost of the season that occurred in exposed localities over the northern portion of the district on the 17th.

Dry weather prevailed from the 17th to the 29th, when general showers occurred. Timely forecasts of the showers were issued.—*I. W. Cline, District Forecaster.*

CHICAGO FORECAST DISTRICT.

One of the most severe storms of the month reached the middle Missouri Valley on the morning of the 12th. The wind blew with considerable force on Lakes Michigan and Superior on that day, but by the morning of the 13th the storm had lost energy. Storm warnings were ordered for the upper Lakes on the morning of the 12th. On the morning of the 23d a storm from the British Northwest Territory appeared over Lake Superior. Storm warnings were ordered in the morning, but the storm lost force during the night of the 23d. A storm that had moved eastward over the northern tier of States passed over the upper Lake region on the morning of the 26th. Southwest storm warnings were ordered on the morning of the 25th and changed to northwest on the morning of the 26th. The storm caused high winds in the upper Lake region.

Frost warnings were ordered on several days, and they were generally verified. Although the frosts were quite severe, it is thought that in many parts of the corn belt no damage was caused. The cranberry growers of Wisconsin received warnings in advance, and where a water supply was available for flooding no injury resulted.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

Warnings were issued on the morning of the 12th for the first cold wave of the season, with freezing temperatures in the high districts of western Colorado and southern Utah. The light and heavy frosts of the month were covered by forecasts and warnings that were widely distributed.—*F. H. Brandenburg, District Forecaster.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	3, a. m.	53	122	9, a. m.	41	72	3,300	6.0	550	22.9
II	7, a. m.	41	124	{11, p. m.	35	75	3,300	4.5	733	30.5
				{12, p. m.	41	70	3,700	5.5	673	28.0
III	{13, a. m.	51	114}	20, a. m.	45	64	{4,400	7.0	628	26.2
	{14, a. m.	41	118}				{4,300	6.0	717	29.9
IV	22, a. m.	54	114	27, p. m.	46	60	3,450	5.5	627	26.1
V	25, p. m.	47	123	29, p. m.	39	75	2,875	4.0	719	30.0
Sums							25,325	38.5	4,647	193.6
Mean of 7 paths							3,618		664	27.7
Mean of 38.5 days									658	27.4
Low areas.										
I	{4, p. m.	40	122}	11, a. m.	48	54	{4,000	6.5	615	25.6
	{6, p. m.	51	114}				{2,850	4.5	633	26.4
II	10, a. m.	23	74	16, a. m.	33	82	1,275	4.0	319	13.3
III	11, a. m.	39	109	14, a. m.	48	54	3,225	3.0	1,075	44.8
IV	13, a. m.	26	65	16, a. m.	40	75	1,325	3.0	442	18.4
V	14, p. m.	40	91	18, a. m.	50	64	1,900	3.5	543	22.6
VI	24, a. m.	51	120	29, a. m.	48	54	3,800	5.0	760	31.7
Sums							18,375	29.5	4,387	182.8
Mean of 7 paths							2,625		627	26.1
Mean of 29.5 days									623	26.0

For graphic presentation of the movements of these highs and lows see Charts I and II.—*George E. Hunt, Chief Clerk, Forecast Division.*

SAN FRANCISCO FORECAST DISTRICT.

In northern California very little rain fell. High wind velocities occurred at Point Reyes Light on the 12th and 13th and at coast points near San Francisco on the 23d. Reports from the Farallon Islands during the last half of the month were of great value to the shipping interests. The last decade of the month was marked by generally showery weather in southern California, and a marked disturbance over the Valley of the Colorado on the 27th was accompanied by showers in southern California that were forecast on the morning of the 27th.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

No severe storms occurred. East of the Cascade Mountains light frosts were frequently reported during the last half of the month, and on the 30th generally in western Oregon. Heavy or killing frost was not reported except at a few exposed points. Warnings were issued in advance of the occurrence of each frost.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

Nothing of special interest transpired in the various river and flood districts during September, except the freshets in the Ocmulgee and Oconee rivers, description of which follows by Mr. John R. Weeks, Official in Charge of the Weather Bureau office, at Macon, Ga.

From St. Paul to St. Louis the mean stages of the Mississippi ranged from 2 to 3 feet higher than the preceding month, while from St. Louis southward to New Orleans they were somewhat lower. The waters of the Missouri, Ohio, Cumberland, and Tennessee continued to decline slowly, and with few exceptions, the lowest gage readings were reported on or about the last day of the month.

As a result of the tropical rainstorm which remained nearly stationary over the east Gulf States from the 13th to the 16th, inclusive, the danger lines were approximated in the lower stretches of nearly all the Alabama, Georgia, and South Carolina streams, but were reached at only a few places on the Ocmulgee and Oconee rivers, where timely warnings prevented any damage, except such as was unavoidable.

FRESHETS IN THE OCMULGEE AND OCONEE RIVERS.

Rains occurred in the above river district for the twenty-four hours ending at 8 a. m., September 15, 1903, as follows: Macon, 2.31 inches; Covington, 3.80 inches; Monticello, 2.44 inches; Atlanta, 1.92 inches; Gainesville, 2.26 inches; Milledgeville, 1.54 inches; Waycross, 1.80 inches; Eastman, 2.40 inches; Griffin, 5.42 inches; Athens, 2.42 inches; Beech Hill (to 2 p. m.), 3.62 inches. A bulletin and warning was therefore issued at 10 a. m., containing the following forecast:

"Rains continue to-day. The river at Macon will reach, and may exceed, danger line to-night and Wednesday. The Oconee will have a moderate rise but not to danger line."

This was sent to over three hundred addresses and was given by telephone, bulletin, and the local press to local and country addresses. Further rains occurred during the twenty-four hours ending at 8 a. m. the next day as follows: Macon, 1.10 inches; Greensboro, 2.10 inches; Washington, 1.50 inches; Milledgeville, 2.04 inches; Dublin, 2.02 inches; Athens, 1.98 inches; Augusta, 1.28 inches. Another bulletin was therefore issued to Oconee River interests, containing the following:

"A moderate freshet is indicated for the Oconee River which will cover medium lowlands and pass Dublin the last of the week."

The freshet in the Ocmulgee passed Macon September 17, with a stage not quite at the danger line, but it exceeded the danger line slightly at Abbeville on the 23d. Some damage was done to crops on lowlands, but other interests were fully prepared and sustained no damage.

The freshet in the Oconee passed Dublin September 20. The banks are high at that point and it did not reach the danger line, but some lowlands were covered, the damage being slight and unavoidable. These freshets were not as high as they would otherwise have been from the amount of rainfall had it not been for the excessive dryness of the soil. On the whole they were beneficial, as the warnings enabled lumbermen, boatmen, and rice planters to prepare for the higher water and take advantage of it in their work.

The highest and lowest water, mean stage, and monthly

range at 175 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock on the Arkansas; and Shreveport, on the Red.—*George E. Hunt, Chief Clerk, Forecast Division.*

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Service Divison.

The following summaries relating to the general weather and crop conditions during September are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3000 and 14,000, respectively:

Alabama.—Drought continued in northern and western counties; heavy to locally excessive rains and high winds damaged cotton, late corn, and cane in middle and southeastern counties during middle of month; light frost in some northern counties. Cotton opened rapidly, much of it prematurely; picking well advanced by close of month. Early corn matured well, promising good yield; late corn practically a failure. Minor crops fair. Much hay and fodder saved. Very little fall plowing or seeding done.—***F. P. Chaffee.***

Arizona.—The early part of the month was very warm, but moderate temperatures prevailed during the middle and latter portions. Over a large part of the Territory rains were quite well distributed throughout the month, and near the end there were good general rains. There was some damage to crops by frost in the northern part of the Territory, but elsewhere late crops did well. The late rains insured good grazing for stock on ranges.—***M. E. Blystone.***

Arkansas.—Cotton made little improvement owing to adverse weather conditions; it opened slowly and very little picking was done until the latter part of the month, and at the close only a small percentage had been picked; there was very little top crop and indications were for about two-thirds of an average crop. Late corn suffered for moisture; harvesting of early begun. Rains the last week of the month improved late potatoes, turnips, and pastures. Late apples scarce, quality inferior. Too dry for fall plowing.—***Edward B. Richards.***

California.—Weather conditions during almost the entire month were remarkably favorable for ripening fruits and grapes, as well as for fruit drying and raisin making. The rain in southern California on the 27th caused slight damage to beans and unprotected hay, but owing to ample warnings there was no material injury to raisins and drying fruits. High winds in the interior caused trifling damage to grapes and late fruits. Fires destroyed much valuable timber in the coast region.—***Alexander G. McAdie.***

Colorado.—Streams were about normal, but the water supply was inadequate throughout the month. Soil was dry and plowing difficult, although the rains prior to the middle of the month afforded some relief. From the 15th to the 17th severe cold weather was general. Of the staple crops corn on irrigated lands and late potatoes were slightly injured, but general truck suffered considerable loss. Harvest in higher districts was practically finished before the cold period, while thrashing continued throughout the month. Corn cutting and potato digging were well under way, along with harvest of winter vegetables and third crop of alfalfa, shortly after the cold period; ranges were fair, and stock did well.—***F. H. Brandenburg.***

Florida.—General crop conditions up to the commencement of the second decade were favorable. A hurricane crossed the south-central portion of the State on the 11th, and the western portion close to the Apalachicola River on the 13th. The heavy rains accompanying the hurricane were particularly damaging to gardens. The citrus crop suffered only moderately, and that from "thorning." Cotton was blown from the bolls, sanded, and the stalk badly whipped; much of it also sprouted. Timber which had been boxed was blown down. By the close of the month, however, crops had experienced more or less recovery from the damage inflicted by the storm.—***G. Harold Noyes.***

Georgia.—The temperature was below normal, but there were several days with excessive heat early in the month. The rainfall was below normal in the northern section, but was above the average elsewhere. The bulk of the precipitation occurred from the 13th to the 16th. Cotton was seriously damaged by drought and unseasonably cool nights; picking was active after the 10th, but the yield was regarded as below normal in quality and quantity.—***L. A. Judkins.***

Idaho.—Harvest was retarded and grain somewhat damaged by wet weather in northern counties. Weather generally favorable for rapid maturing of fruit in southwestern districts; packing and shipping of prunes nearly completed by the close of the month; some winter apples were harvested during the month.—***S. M. Blandford.***

Illinois.—Light to heavy frosts occurred on the 17th and 18th, but no serious injury to vegetation ensued. Rainfall in the northern district was excessive; in the central and southern districts, deficient; in the southern district the deficiency was pronounced. Except in the southern district, pastures maintained an excellent condition throughout the month. Plowing progressed under favorable conditions, and considerable rye and wheat had been sown. By September 30 corn had matured beyond expectations, and the bulk of the crop was practically safe from injury by frost.—***Wm. G. Burns.***

Indiana.—Droughty conditions in south section and few counties of central section dried corn prematurely and delayed fall seeding. Light frost throughout State 17–18th did no material damage. Corn crop fair in south and good in north portions of State, practically all safe from injury by frost. Wheat sowing well advanced in central and north sections. Apple crop light and much of the fruit inferior. Potatoes yielding only a light to fair crop. Canning of corn and tomatoes completed in south section; crop fair; in other sections tomato vines continued green and the fruit ripened slowly.—***W. T. Blythe.***

Iowa.—Frost on several dates, with very small damage, except in limited areas. Fully 80 per cent of corn crop well matured at close of month and balance nearing maturity. Good progress made in harvesting minor crops and plowing. Potato crop materially hurt by rotting. Winter apple yield light. Second crop of hay unusually heavy, and pasturage extra good.—***John R. Sage.***

Kansas.—By the end of the month the early corn was ready to crib in the northern counties; late corn had ripened rapidly and the larger part of it was out of danger from frost. Haying had ended. Wheat sowing was finished in some counties and continued in others; much of the early sown wheat was up and presented a good stand. Kafir corn and cane were in good condition, but the larger portion of these crops was too green to cut.—***T. B. Jennings.***

Kentucky.—The temperature averaged considerably above the normal until the 16th, when it fell rapidly and continued quite cool during the remainder of the month. Light frosts were general on the 18th and 19th. Tender vegetables and late fields of tobacco were injured, but the extent of the damage was not great. A severe drought prevailed during the latter part of the month; late corn suffered severely, the sowing of winter wheat was stopped, pastures dried up, and water for stock became scarce in many places.—***H. B. Hersey.***

Louisiana.—Cotton suffered from the effects of unseasonably cool weather at different times during the month; rust, shedding, and premature opening caused injury to the crop in several places. The weather was favorable for picking, which, however, on account of the backwardness of the crop, did not become general until toward the middle of the month. About one-third of the crop had been picked by the close of the month. Dry, cool weather checked the growth of sugar cane, and, as a result, the stalk will be short. Rice harvest and thrashing made satisfactory progress and the yield is good. Corn was being housed in good condition. The weather has been too cool and dry for fall gardens.—***I. M. Cline.***

Maryland and Delaware.—The month was favorable for farm work. Wheat seeding was general last of month and early wheat already up in the west. Corn crop light and quality below average; larger part of crop was in shock by last of the month, but much late corn still green. Tobacco crop fair to good, but curing unsatisfactorily. Tomato crop good in east, light in north and west. Apples abundant and of good quality. Poor yield of late potatoes; considerable loss by rotting.—***Oliver L. Fassig.***

Michigan.—The month, as a whole, was unfavorable to the best maturing of corn, while the excessive moisture did great damage to potatoes by causing extensive blight of the vines and rotting of the tubers. The continued rains of the early part of the month spoiled some of the early beans, delayed the maturing of late beans and interfered with their harvest. Beans were much damaged and considerably discolored. Wheat and rye seeding progressed rather slowly, but germinated splendidly.—***C. F. Schneider.***

Minnesota.—The first half of the month was very wet, the rains of the 11th in the Minnesota Valley having probably been exceeded in amount but once in the past 30 years. The latter half of the month was dry until the general rains which began on the 29th. Light frost in northern and central portions on the 4th and 5th; freezing temperatures in northern and western portions on the 16th to 18th, and several light frosts in the latter part of the month; only the most tender vegetation seriously injured. Grain in shock and stack was still damp late in the month, but it was being thrashed where the ground was not too soft for machines to move. Potatoes were being dug, but they were rotting badly. Considerable plowing done.—***T. S. Outram.***

Mississippi.—Owing to the cool and very dry weather cotton deteriorated rapidly throughout the month; rust, shedding, and premature opening was very damaging; boll worms were quite destructive in portions of of the delta; picking was in full progress, the yield being below the average. Corn was being gathered, the early yielding well and the late fairly good. Large yields of forage crops were secured in splendid condition.

Sugar cane and sweet potatoes were somewhat damaged by the drought, and fall crops were very unpromising. Pastures were short and stock water was scarce.—*W. S. Belden.*

Missouri.—Rains in the central and northern portions of the State during the early part of September somewhat retarded the ripening of corn, but during the latter half of the month the weather was ideal and by the 30th much the greater portion of the crop was out of danger. Fall seeding was delayed by drought in portions of the southern section, but elsewhere the soil was in good condition, the bulk of the wheat crop was sown, and at the close of the month much of it was up and growing finely.—*A. E. Hackett.*

Montana.—Killing frosts were quite general about the middle of the month, but they caused very little damage, as most crops had been secured. Thrashing progressed actively in all the grain districts, and results were unusually satisfactory in the Gallatin and Flathead valleys, and ranged from an average to better elsewhere. Late haying was finished; the yield from this crop was fair in the valleys of the western half of the State, but was short in the eastern counties. A third crop of alfalfa was cut in the south-central counties and produced a very good yield for a third crop.—*Montrose W. Hayes.*

Nebraska.—Corn matured slowly during the first half of September and was much behind normal condition of development when the unusually cold period which lasted from the 13th to the 17th covered the State. The heavy to killing frost that occurred on the 16th materially injured corn in all except the southeastern counties. The damage in central counties was from 25 to 50 per cent. Haying progressed nicely and was about completed at the end of the month. Wheat seeding was general the last half of the month. Considerable wheat is up and growing finely.—*G. A. Loveland.*

Nevada.—The weather throughout the month was dry and generally clear, with temperature about normal. A destructive frost on the morning of the 14th caused great damage to potatoes and garden truck. The harvesting of hay and grain was finished about the 15th, and at the close of the month most of the grain had been thrashed, with satisfactory yields.—*J. H. Smith.*

New England.—Weather generally favorable for harvesting and housing crops. Frosts in the second week were quite destructive, and generally killing frosts occurred on the 19th. High winds damaged apples, which will be light in most localities. Corn crop, both field and sweet, poor. Large yield of potatoes, but much rot. Cranberries of good quality, but quantity below average. Hay a good crop and secured in good condition. Tobacco exceptionally free from damage by insects; yield above the average and of good quality.—*J. W. Smith.*

New Jersey.—During the very destructive storm of the 16th the great bulk of the apple crop was blown from the trees and many shade and fruit trees were uprooted; along the seacoast the destruction was unusually great, many large buildings, pavilions, and barns being unroofed and a large amount of property injured. At the close of the month plowing and seeding were well advanced. The prevailing mild weather favored the maturing crops. Heavy frosts occurred at widely scattered stations on the mornings of the 29th and 30th, but did no serious injury.—*Edward W. McGann.*

New Mexico.—Very dry in northeastern sections, and wells and springs failing. Grass short on the ranges, but unusually well cured, and all stock in very good condition. Frost on 17th, but no general damage.—*R. M. Hardinge.*

New York.—The lightest September rainfall in 16 years. Month generally favorable for work and maturing crops. Corn very late, but other crops harvested without material damage by frost, no general frost occurring up to September 30. Potatoes large yield, but rotting badly. Oats and barley heavy, but damaged by rain. Beans light. Hops and tobacco housed in good condition. Pastures fine; second hay crop secured. Limited supply of apples, but quality excellent. Buckwheat heavy, with yield less than expected. Grapes light.—*R. G. Allen.*

North Carolina.—Conditions were very favorable for making hay, saving fodder, and fall plowing, but cool nights and general deficiency of moisture was not suitable for many crops of late growth, especially cotton. After the general rain on the 16th and 17th a period of very dry weather prevailed to the end of the month, with some injury to turnips and clover. Frosts occurred in mountain sections, with a little damage to late corn. Cotton deteriorated during the month, and many complaints of rust and premature opening were received; the crop opened rapidly and picking was well advanced by the close of the month. Gathering of corn and housing of tobacco progressed favorably. Minor crops gave good yields. Fall plowing and seeding winter wheat and oats were behind the average stage of progress.—*C. F. von Herrmann.*

North Dakota.—Harvest and thrashing were seriously interfered with by cool, wet weather in the early part of the month. Frosts of the 3d to 5th killed corn, flax, and late vegetation in some localities. A severe rain and snowstorm about the middle of the month damaged harvested grain and hay considerably, while severe freezing weather following destroyed vegetation in all sections. At the close of the month about one-third of the wheat and most of the rye, barley, and oats had been thrashed.—*F. J. Rupert.*

Ohio.—Corn was generally good in the north, but matured slowly; in the south it was injured by drought; much of the crop was in shock at the end of the month. Wheat seeding advanced satisfactorily in the north, but was much delayed in the south by drought. Clover seed light to fair. Buckwheat fair. Potatoes decayed considerably in the north. Only a light crop of apples is indicated.—*J. Warren Smith.*

Oklahoma and Indian Territories.—Plowing and seeding well advanced; early sown wheat good stand. Corn cutting in progress; fair to good yields. Cotton did well, but opened slowly; damaged considerably by sharpshooters, bollworms, shedding, and rust; first bales marketed by the 14th; good color and staple. Hay, broom corn, cane, and Kafir corn harvests continued; good yields. June corn, castor beans, turnips, and late potatoes did well. Late fruits being secured; apples fair to good, peaches poor to fair yields. Pastures in good condition and stock did well.—*C. M. Strong.*

Oregon.—The month was favorable for hop picking and for the completion of harvesting and thrashing. Fall plowing progressed satisfactorily in eastern Oregon, where copious rains placed the soil in excellent condition for work; in the western section, however, the weather was drier and but little plowing was done. Prune picking and drying progressed nicely and an excellent crop was secured. Potato digging was actively pushed, the yield being variable. Late apples continue fair to good.—*Edward A. Beals.*

Pennsylvania.—Prevailing conditions fairly favorable for plowing, seeding, and the maturing and harvesting of late crops. At the close of the month a large acreage of corn was still two weeks from maturity; farm work was well advanced; an unsatisfactory potato crop was being secured; buckwheat was in fine condition and promised excellent returns; early sown wheat was coming up nicely; a fair crop of tobacco was practically all housed; and fruits, as a whole, were scarce.—*T. F. Townsend.*

Porto Rico.—The weather was generally favorable for all crops. Canes maintained a healthy color and steady growth during the month and were in a more promising condition than at the same time last year. Coffee was maturing slowly and picking was general during the last of the month. Rice and corn were harvested; yield from the rice was poor. Corn was of good quality and abundant. Cotton picking began at several places about the middle of the month; yield satisfactory. The shipping of oranges was well under way at the close of the month. Very little tobacco was sown during the month. Some corn, beans, and other small crops were planted. Planting of cane for gran cultura continued throughout the month. Fruits and small crops were generally plentiful. Pasturage was good and stock fat.—*E. C. Thompson.*

South Carolina.—The weather conditions were exceptionally favorable for harvesting operations, and rapid progress was made in gathering corn, harvesting rice, picking cotton, and curing hay. It was too dry for the growth of fall crops and for seeding operations, although some rye and oats were sown. Much truck was planted in the coast districts and came up to fair stands.—*J. W. Bauer.*

South Dakota.—Cloudiness and showers were the rule until the 16th, snow falling in the Black Hills and other localities on the 13th and 14th. Heavy or killing frosts were general on the 16th, killing tender vegetation and generally stopping the growth of corn. The month closed with all work backward. Three-fourths of the corn crop matured in sound condition, and the remainder is good fall feed. Grain and flax yields were generally good, but much wheat was deficient in quality. The yield of potatoes was below expectations.—*D. P. McCallum.*

Tennessee.—The month was the driest September on record. All late crops suffered from the drought, especially corn, potatoes, and cotton. A good crop of tobacco was cut and housed. At the close of the month the prospect was for a light crop of cotton. Early corn made a good yield. Light frosts about the 18th and 25th did but slight damage. Fall plowing and seeding were delayed by the dry weather.—*H. C. Bate.*

Texas.—The month opened with drought prevailing in the north and west portions of the State. Good showers occurred in the northwest portion on the 10th, and the west portion on the 16th. Good to heavy rainfall was quite general over the State on the last three days of the month. Cotton in the north and west portions was suffering from drought at the beginning of the month and the entire belt was feeling the need of rain before the close of the second decade. As a result of shedding and retarding of fruiting, caused by drought, and the ravages of boll weevils in the southwest, central, and east portions the crop was cut very short in all sections. The bolls were opening nicely at the beginning of the month and picking progressed rapidly. Late corn was damaged by the drought, but early corn made a very satisfactory yield, and most of it had been housed. Considerable wheat and oats were sown. Sugar cane did well. Rice harvesting and thrashing progressed rapidly, and excellent yields were secured.—*L. H. Murdoch.*

Utah.—Unseasonable warmth during the first five days was succeeded by abnormally cool weather until the 20th, with considerable frost that damaged tender vegetation. Plowing for fall grain made little headway owing to the dry condition of the soil. Harvesting of spring grain was completed, but thrashing was still in progress. Sugar beets were being dug with yields generally good. Potatoes and tomatoes were being gathered. The last-named crop suffered somewhat in localities from frosts. The third crop of lucerne was gathered with yields from fair to good.—*R. J. Hyatt.*

Virginia.—The weather was favorable for fieldwork, but plowing was retarded to some extent by drought. Tobacco cutting and housing car-

ried on till the 20th and fodder pulling and corn cutting till the last week. Pastures good throughout the month. Apple crop ripening; some dropping and rotting reported; picking and shipping commenced about the 10th.—*R. F. Young.*

Washington.—The month was cool and wet; in the northern part of the western section the amount of rainfall was two to four times the normal. Harvesting and thrashing were interrupted, considerable wheat wet in the eastern section, and a large amount of oats in the western counties. Hops were not much damaged. Pastures and root crops were greatly benefited. Much plowing and fall wheat seeding done; early sown fall wheat germinated.—*G. N. Salisbury.*

West Virginia.—The drought continued throughout the month, and crops were injuriously affected. Comparatively little plowing or seeding was done, as the ground was too hard and dry. Corn cutting progressed rapidly during the last two weeks, with prospects of about half a crop. Pastures were short and water scarce, but stock was in very good condition. There was practically no fruit except apples, and these were scarce, except in some few counties, where a fair to good crop is promised.—*E. C. Vose.*

Wisconsin.—During the early part of the month light to killing frosts occurred in the northern and central sections, doing some damage to corn, potatoes, and gardens; the second week opened more favorably as to temperature, but unsettled weather with heavy rains prevailed. While the latter portion of the month was favorable for farm work, the heavy rains continued in the west portion and killing frosts occurred in central and northwest counties. The frost of the 18th was general, killing corn in the western half of the State, but on the whole the crop harvested was better than anticipated. Potatoes in some sections are a total failure, while in other localities a fair crop will be marketed. Tobacco secured and curing well. Sugar beets an excellent crop. Apples light crop but fair quality. Cranberry crop satisfactory and excellent quality.—*J. W. Schaefer.*

Wyoming.—The killing frosts of the second week of the month ended the crop season in the State, but did but little damage, as most of the crops had already matured. Heavy rain or snow was general from the 11th to the 15th, and was followed by unusually cold weather. At many stations the precipitation for the month was the greatest on record for September.—*W. S. Palmer.*

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Summary of temperature and precipitation by sections, September, 1903.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	73.2	−1.5	Madison, Talladega	102	6	Cordova	35	19	1.42	−1.63	Dothan	5.60	Haleysville	T.
Arizona	74.8	−1.5	Parker	119	3	Fort Defiance	25	16	1.86	+0.78	Flagstaff	4.68	Parker	0.17
Arkansas	70.7	−2.3	Prescott	102	15	Pond	34	17	2.44	−1.14	Dallas	7.38	Arkansas City	0.40
California	68.7	0.0	Salton	120	3, 4	Bodie	7	16	0.10	−0.30	Idyllwild	2.21	More than half of the stations.	0.00
Colorado	56.2	−2.1	Lamar	103	2	Ashcroft	11	16	1.13	+0.07	Meeker	4.42	Cheyenne Wells, Rocky Ford.	T.
Florida	77.9	−0.9	Molino	103	12	Wausaw	43	23	7.28	+0.60	Fort Meade	19.04	Molino	0.00
Georgia	73.1	−1.4	Lumpkin, West Point	102	6	Ramsey; Clayton	40	19; 30	4.40	+0.92	Thomasville	12.73	Adairsville	0.78
Idaho	54.4	......	Payette	100	2	Chesterfield	15	9	1.23	......	Murray	3.11	Garnet	T.
Illinois	65.9	−0.6	Benton	99	7	Lanark	26	18	3.86	+0.54	La Harpe	7.65	Olney	0.42
Indiana	66.5	−0.3	Salem	99	14	Salem	32	18	1.86	−0.93	La Porte	4.79	Evansville, Holland	0.49
Iowa	60.8	−3.4	Logan	94	1	Larchwood	28	16	3.81	+0.61	Larrabee	8.79	Waukee	1.42
Kansas	66.8	−2.0	Wallace	101	2	Achilles	21	17	2.25	−0.36	Burlington	7.69	Lakin	T.
Kentucky	69.2	−0.4	Cadiz	100	7	Edmonton; Greensburg, Loretto; Shelby City	32	18; 19; 19	0.91	−1.91	Scott	3.31	Cadiz, Middlesboro	T.
Louisiana	75.2	−2.0	Libertyhill	101	10	Robeline	40	18	1.72	−2.06	Lakeside	8.01	Cameron, Oxford	0.00
Maryland and Delaware	66.0	−0.9	Boettcherville, Md	98	4	Oakland, Md	23	29	2.05	−1.55	Seaford, Del	4.15	Great Falls, Md	0.58
Michigan	59.7	−0.3	Adrian; Cassopolis	92	4; 6, 8	Roscommon	20	29	3.42	+0.58	Bay City	8.05	Cheboygan	0.25
Minnesota	55.5	−2.9	Winnebago City	89	22	Pokegama Falls	19	28	5.63	+3.00	Red Wing	10.07	Pipestone	2.96
Mississippi	73.4	−1.7	Okolona	101	6	Ripley, Tupelo	38	18	0.67	−2.18	Pearlington	2.59	Louisville	0.00
Missouri	66.6	−1.8	Caruthersville; Marblehill	98	5; 6	Mount Vernon; Ironton	32	17; 18	4.41	+0.82	Avalon	8.58	Lamar	0.72
Montana	51.8	−2.2	Glendive	90	28	Red Lodge	16	15	1.34	+0.15	Hayden	2.56	Glasgow	0.14
Nebraska	60.6	−3.0	Lynch	99	25	Kennedy	20	16	1.52	−0.61	Rulo	7.66	Madrid	0.00
Nevada	60.2	−0.8	Rioville	114	1	Potts	17	15	0.18	−0.23	Morey	1.60	8 stations	0.00
New England*	61.0	+0.7	Stratford, N. H	95	16	Fort Fairfield, Me	23	8	1.66	−0.68	Hawleyville, Conn	6.17	Enosburg, Vt	0.45
New Jersey	65.0	−1.2	Indian Mills	92	14	Layton; Charlotteburg	29	29, 30; 30	3.34	−0.48	Bergen Point	7.10	Layton	1.39
New Mexico	63.4	−1.1	San Marcial	102	3	Winsors	20	17	1.45	+0.02	Strauss	4.15	Albert	T.
New York	61.2	+0.7	Elmira	93	14	Franklinville	23	29	1.59	−1.78	Bedford	4.80	Plattsburg	0.10
North Carolina	69.0	−1.5	Southport	95	5	Linville	27	19	2.72	−1.62	Highlands	8.87	Bryson City	0.12
North Dakota	52.2	−5.4	Minot	90	1	New England City; Willow City	18	14	3.24	+2.27	Fargo	5.61	Devil's Lake	1.56
Ohio	65.6	+0.3	Chillicothe, Dayton; Warsaw	98	9; 13	Milligan	26	19	1.52	−1.24	Bangorville, Delaware.	3.17	McConnellsville	0.23
Oklahoma and Indian Territories.	71.3	−2.2	Mangum; Taloga	104	8; 7, 8	Newkirk	32	27, 28	2.08	−0.43	Hugo	4.80	Kenton	0.04
Oregon	58.2	−0.4	Williams	97	3	Bend	19	30	1.30	−0.75	Nehalem	8.67	Beulah	T.
Pennsylvania	63.2	0.0	Freeport; California	94	12; 14	Bushore	27	30	2.09	−1.49	Saltsburg	3.88	Aleppo	0.91
Porto Rico	78.8	......	San German	97	19	Cidra	58	22	6.65	......	Utuado	15.05	Coamo	1.15
South Carolina	72.7	−1.5	Anderson; Clemson College, Gaffney.	100	6; 5, 6	Seivern	41	29	3.62	−0.38	Yemassee	9.43	Due West	0.60
South Dakota	57.6	−3.5	Rosebud	101	24	La Delle	23	16	2.74	+0.97	Sisseton Agency	6.19	Fairfax	0.48
Tennessee	69.5	−0.5	Lebanon; Pope	100	8; 11	Rugby	29	18	0.53	−2.60	Brownsville	2.00	6 stations	T.
Texas	75.2	−0.4	Bowie	103	10	Kerrville	36	18	2.52	+0.10	Gainesville	10.54	4 stations	T.
Utah	58.5	−2.8	Green River	103	1, 3	Woodruff	16	9	0.90	+0.03	Ranch	3.02	3 stations	0.00
Virginia	66.9	−2.0	Newport News	95	12	Burkes Garden	25	25	2.06	−1.49	Blacksburg	4.96	Elk Knob	0.27
Washington	56.4	−1.1	Hooper	95	4	Wilbur	20	29	2.65	+0.55	Clearwater	10.46	Odessa	0.13
West Virginia	64.7	−0.8	Uneeda; Old Fields	97	14; 15	Traveller's Repose	25	25, 29	1.30	−1.53	Pickens	2.78	Bluefield	0.10
Wisconsin	58.7	−1.7	Florence	90	19	Butternut, North Crandon, Koepenick, Prentice	20	28	5.14	+2.08	Whitehall	11.48	Hancock	2.46
Wyoming	51.5	−2.9	Ft. Laramie	98	2	Chugwater	7	15	1.50	+0.88	Moore	3.06	Basin	0.26

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

SPECIAL CONTRIBUTIONS.

RECENT PAPERS BEARING ON METEOROLOGY.

Dr. W. F. R. PHILLIPS, Librarian, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——.

Scientific American. New York. Vol. 89.
—— The Berliner Aeroplane. P. 216.
Walker, J. E. Atmospheric Disturbances. P. 218.
Guarini, Emile. The Flight of Birds mechanically studied. Pp. 256-257.

Scientific American Supplement. New York. Vol. 56.
Maxim, Hudson. Radio-Activity—the secret of Radium's light and heat. Pp. 23204-5.
—— The Lebaudy Airship. P. 23221.

Science. New York. N. S. Vol. 18.
Shattuck, Geo. B. The Expedition to the Bahama Islands of the Geographical Society of Baltimore. Pp. 427-432.
Ward, R. DeC. Rainfall in India. [Note on Indian Meteorological Memoirs, Vol. XIV.] P. 505.
Ward, R. DeC. Tornado at Gainesville, Ga., June 1, 1903. [Note on article of J. B. Marbury.] P. 505.
Ward, R. DeC. Weather Reports from Vessels at Sea. [Note on article of A. G. McAdie.] P. 505.

Nature. London. Vol. 68.
Shaw, W. N. Methods of Meteorological Investigation. Pp. 468-472.
See, T. J. J. Height of the Atmosphere Determined from the Time of Disappearance of Blue Colour of the Sky after Sunset. P. 526.
Lodge, Oliver. Glow-worm and Thunderstorm; also Milk. P. 527.
Wilson, C. T. R. Condensation Nuclei. Pp. 548-550.

London, Edinburgh, and Dublin Philosophical Magazine. London. 6th Series. Vol. 6.
Rayleigh, Lord. On the Production and Distribution of Sound. Pp. 289-305.
Owen, Gwilym. On the Condensation Nuclei produced in Air and Hydrogen by heating a Platinum Wire. Pp. 306-315.
Barnes, H. T. and McIntosh, D. A new Form of Platinum Resistance-Thermometer, specially adapted for the Continuous-flow Calorimeter. P. 350-352.
Townsend, John S. On Ionization produced by the Motion of Positive and Negative Ions. Pp. 358-361.
Cook, S. R. On the Distribution of Pressure around Spheres in a Viscous Fluid. Pp. 424-436.
Walker, George W. On the Theory of Refraction in Gases. Pp. 464-492.

American Journal of Science. New Haven. 4th Series. Vol. 16.
Barus, C. Note on the Constants of Coronas. Pp. 325-327.
Bumstead, H. A. and Wheeler, L. P. Note on a Radio-active Gas in Surface Water. P. 328.

Symons's Meteorological Magazine. London. Vol. 38.
—— The British Rainfall Organisation. Pp. 129-132.
Clark, J. Edmund. The Study of Sunspot Cycles. P. 136.
Wilmshurst, A. J. The Wet Summer. P. 137.
Aldridge, Edward G. Curves of Monthly Mean Temperatures for Verkhoyansk (Siberia), the Sonnblick (Austrian Alps), Ben Nevis, Ross, and the Scilly Isles. Pp. 139-141.

Journal of the Franklin Institute. Philadelphia. Vol. 156.
Haupt, Lewis M. Controlling the Floods of the Mississippi River. Pp. 241-260.

Western Electrician. Chicago. Vol. 33.
Horton, W. H. The Sun's Apparent Electrical Influence on the Earth. P. 275.

Popular Science Monthly. New York. Vol. 63.
King, A. F. A. An unusual Aurora Borealis. Pp. 563-564.

Journal of the Manchester Geographical Society. Manchester. Vol. 18.
Black, W. G. Rainfall in 1901. Pp. 163-164.

Annuaire de la Société Météorologique de France. Paris. 51me année.
Raulin, V. Sur les observations pluviométriques en Australie de 1881 à 1900. Pp. 121-134.
—— Observations météorologiques à El-Athroun. [Review of article of R. P. Victor.] P. 135.

La Nature. Paris. 31me Année.
Parville, Henri de. Utilisation industrielle de l'air atmosphérique. Pp. 314-315.

Comptes Rendus de l'Académie des Sciences. Paris. Tome 137.
Mascart, Jean. Description d'un orage très localisé. Pp. 468-469.

Archives des Sciences Physiques et Naturelles. Genève. 4me Période. Tome 14.
Gautier, R. et Duaime, H. Observations météorologiques faites aux fortifications de Saint-Maurice pendant l'année 1902, résumé annuel. Pp. 310-327.

L'Aérophile. Paris. 11me année.
Chanute, O. La navigation aérienne aux États-Unis. Pp. 171-183.
Le Cadet, G. Étude de l'électricité atmosphérique. Pp. 209-211.

Ciel et Terre. Bruxelles. 24me année.
—— La forme des cristaux de neige. [Review of work of Wilson A. Bentley.] Pp. 336-338.
—— L'électricité atmosphérique au sommet du mont Blanc par beau temps. [Review of work of G. Le Cadet.] Pp. 338-339.
—— Une tempête au Congo. Pp. 339-340.
—— Vague de marée dans le Pacifique. P. 340.

Petermanns Mitteilungen. Gotha. Band 49.
Krümmel, O. Die geographische Verbreitung der Wind und Wassermotoren im Deutschen Reiche. Pp. 169-173.

Das Weltall. Berlin. 3 Jahrg.
Sieberg, Aug[ust]. Ueber ringförmige Gebilde um Sonne und Mond, sowie verwandte atmosphärischoptische Erscheinungen. Pp. 303-307.

Illustrirte Aëronautische Mittheilungen. Strassburg. 7 Jahrgang.
Lüdeling, G. Luftelektrische Zerstreuungs und Staubmessungen auf den internationalen Ballonfahrten am 2. April und 7. Mai 1903. Pp. 321-329.
Wright, Wilbur. Versuche und Beobachtungen im Schwebeflug. Pp. 331-335.

Physikalische Zeitschrift. Leipzig. 4 Jahrgang.
Tamaru, T. Ein neues Prinzip des Vertikalseismometers. Pp. 637-640.
Righi, A. Ueber die Ionisierung der Luft durch eine elektrisierte Spitze. Pp. 641-645.
Byk, A. Zur Kenntniss des unipolaren Leitvermögens in erhitzten Gasen bei Atmosphärendruck. Pp. 645-648.
Kaufmann, W. Zur Glimmentladung bei Atmosphärendruck. Pp. 653-655.
Saake, W. Messungen des elektrischen Potentialgefälles, der Elektrizitätszerstreuung und der Radioaktivität der Luft im Mochthal von Arosa (Schweiz). Pp. 626-632.

Gaea. Leipzig. 39 Jahrgang.
Ebert, Hermann. Die atmosphärische Elektrizität auf Grund der Elektronentheorie. Pp. 650-657.
—— Die Mengen der neuentdeckten Gase in der Atmosphäre. [Note on work of W. Ramsay.] P. 696.
—— Das photochemische Klima von Kremsmünster. [Abstract of article by Franz Schwab.] Pp. 696-698.

Das Wetter. Berlin. 20 Jahrgang.
Treitschke, Friedrich. Die Aktinometrische Differenz von Erfurt und Bericht über Versuche zur Aufzeichnung des Wärme-effekts der diffusen Strahlen in der Atmosphäre. Pp. 193-198.
Ziegra, Alfred. Untersuchung der "Nachtfrostprognose nach Kammermann" für mehrere meteorologische Stationen Nord und Mittel-deutschlands. Pp. 198-208.

Meteorologische Zeitschrift. Wien. Band 20.
Schneider, J. Die harmonische Analyse der täglichen Luftbewegung über Hamburg. Pp. 385-398.
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Exner, Felix M. Messungen der Sonnenstrahlung und der nächtlichen Ausstrahlung auf dem Sonnblick. Pp. 409-414.
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Jacobi, Max. Immanuel Kant und die Lehre von den Winden. Pp. 419-421.
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WEATHER BUREAU COOPERATION IN RECLAMATION WORK.[1]

By Mr. F. H. BRANDENBURG, District Forecaster.

Among the factors that enter into the consideration of irrigation projects it is manifest that the rainfall over the catchment basin is fundamental. The district embraced in what is known as the arid or semiarid region is so diversified in topography, so irregular as to the distribution of rainfall, and so varied as to the other climatic conditions that have a direct bearing on irrigation enterprises that no general discussion is applicable to all parts of the region. Hence, in these undertakings, it will be necessary to study the peculiarities of each locality with regard to evaporation, sunshine, winds, temperature, snowfall and rainfall.

In regard to rainfall, it may be broadly stated that east of the Continental Divide the warmer half of the year brings more than two-thirds of the annual amount, while on the western slope, as a rule, opposite conditions prevail. Precipitation is uncertain at best, and marked differences in the monthly as well as the yearly values are common. The notion is prevalent that an excess or deficiency of precipitation is followed by compensating conditions. A study of the data of the Denver station, which may be taken as illustrating the climatic conditions of the eastern slope, shows that conditions with respect to precipitation are even more variable than those pertaining to temperature and that *a notably dry or wet season is not likely to be followed by the opposite extreme, but rather by practically normal rainfall.*

While moderate rains lessen the need for irrigation and are highly beneficial to crop growth, they add but little to the volume discharged by the streams. During July and August downpours are not infrequent; nearly all the water finds its way into the streams in a few hours, causing damage to crops on the lowlands, to ditches and to railroads for miles along the valleys. Topography is a larger factor in connection with these heavy storms, or cloud-bursts, and certain localities are more likely than others to be visited. Doubtless the conserving of these waters will receive attention in time, notwithstanding the fact that water stored late in summer will be subject to a large loss by evaporation during the interval that must elapse before the next irrigation season.

Excepting certain large streams on the western slope, from which as yet but little water is diverted for irrigation purposes, our streams are normally low in midsummer, which is the critical time in crop growth, for, as a rule, the altitude is considerable and the planting season about four weeks later than in the same latitude in the great central valleys; the maturing of our crops is thus brought into the period when excessive heat and a scarcity of water are general. It is at such times that advantage is gladly taken of the supply afforded by any heavy local rains that may occur in the upper catchment basins. In Colorado a system of telegraphic reports of gage heights was initiated four years ago by the Weather Bureau, in cooperation with the Geological Survey, to give information in this regard. The volume discharged being published in the morning newspapers, the information was available to interested persons throughout the lower basins one or two days before the approach of the increased flow. Last year, unfortunately, the Geological Survey, owing to lack of funds, was unable to keep up the gaging stations, and this year a like condition in the Weather Bureau, as regards funds, has prevented a resumption of these reports. With an increased number of gaging stations it will be possible to gather quickly, at selected centers, advice regarding these temporary additions to the volume and to disseminate the information, by telegraph or otherwise, so that ditches of late construction that are not beneficiaries in times of scarcity may profit by that which would otherwise be lost to them.

Fortunately the mountain ranges, which are primarily the cause of the aridity prevailing in the western third of our country, furnish some compensating conditions by storing for the crop season the moisture collected in the form of snow during the winter. The period for which snow is thus stored is, of course, dependent on latitude, the altitude of the ranges, and whether they are covered with forests or are bare and fully exposed to the sun and high winds. The character of the spring, whether warm and early or cold and backward, is also an important factor in regulating the flow.

As indicating in a general way the area from which the greater part of the irrigation supplies must be drawn, it may be of interest to note that in Arizona the area of land 5000 feet and over in elevation is 47,120 square miles, or 42 per cent of the total area. Expressed in square miles the area in Washington above 7000 feet has been placed at 1000, or 2 per cent of the whole State; in Oregon 2800, or 3 per cent; in California 6246, or 4 per cent; in Idaho 4100, or 5 per cent; in Arizona 6700, or 6 per cent; in Nevada 13,000, or 12 per cent; in New Mexico 22,300, or 18 per cent; in Utah 20,441, or 24 per cent, and in Colorado 45,885, or 44 per cent.

Feeling assured that a knowledge of the snowfall in these high catchment basins would prove of great value to irrigation interests, the collection of statistics regarding the amount, the distribution, etc., was begun in Colorado during the winter of 1896–97 and published in bulletins, together with a forecast of the character and duration of the flow that might be expected. The snowfall bulletins, published regularly from December to March or April in the different mountain States, have a value beyond that of their current use, for to them reference must be had for information regarding the water supply of many catchment basins not represented by full meteorological reports.

Since variations in the amount and distribution of precipitation, so common in the Plains region, are not absent in the mountains, the volume furnished by melting snow is subject to marked fluctuations. Usually the maximum flow from this source is attained about the middle of June, after which the decline is rapid, unless the flow is augmented by rains. On the eastern slope, as in all highly developed sections, where the supply furnished by a normal snowfall is usually inadequate, except during a short period following maximum melting, a dry summer invariably emphasizes the importance of large reservoirs to tide over such seasons. It is also during these periods of drought that high winds are common and evaporation most pronounced, materially increasing the need for irrigation water, and at the same time appreciably diminishing the stock of snow. It is therefore apparent that evaporation is an important element to be considered in calculations pertaining to reservoirs. Complete data regarding the loss from this source are not available, but Prof. Thomas Russell has shown that during a year of normal temperature, wind, moisture, and sunshine evaporation from free water surfaces could reach 7 feet or more in the extreme eastern and southeastern parts of California. For Utah the possible loss was placed at 70 to 75 inches; for Colorado, between 65 and 70; for New Mexico, between 76 and 80 inches; for Arizona, from 55 to 60 inches in the upland districts and at about 100 inches in the Yuma desert. In Nevada the loss was found to be greatest, namely, 80 to 100 inches.

While for many parts of this vast area information in regard to the different climatic elements is necessarily incomplete, yet in scores of enterprises the data collected by the Weather

[1] The Eleventh National Irrigation Congress was held at Ogden September 15, 1903, and was attended by Mr. F. H. Brandenburg, District Forecaster; Robert M. Hardinge, Section Director, and Walter S. Palmer, Section Director, as representatives of the United States Weather Bureau. They were also appointed by the respective governors as delegates from Colorado, New Mexico, and Wyoming, respectively. This is the address presented by Mr. Brandenburg.—*C. A.*

Bureau have been found valuable aids to engineers and investors. Each State is a section of the Climate and Crop Service of the Bureau, in charge of an official whose duty it is to establish stations of observation. These stations are possible through the voluntary cooperation of public spirited citizens willing to act as observers. Observations include a record of the temperature, rainfall, snowfall, cloudiness, and prevailing winds; reports are rendered monthly, and after examination and computation at the section center, the values are published in quarto form about the 15th of the following month. These printed reports, with the addition of the annual summary, furnish a convenient source of information on climatic features, and may be had free of charge upon application. A considerable number of the stations have been in operation a great many years, while reports from others cover a comparatively short period. If the monthly publication does not give a report from the locality desired, application should be made to the section director for the information, as a copy of all records made at any time within the State in question is on file; thus, in Colorado, the number of discontinued stations is three times as large as that of the stations at present in operation, although these number nearly one hundred.

Records from mountain stations being especially important in the study of precipitation, efforts have been directed, for a number of years, toward increasing the number of observers on the upper watersheds, and while the number of such observers now cooperating is larger than ever before, there is room for a great many more in every section of the arid region.

The importance of these rainfall stations is not fully appreciated by the general public. In the beginning the work of reclamation will necessarily be confined to the larger and more promising undertakings, leaving relatively small ones for later consideration. When these latter are taken in hand full information must be available regarding the rainfall and its seasonal distribution, and whether it comes in small amounts or in an occasional downpour or cloud-burst. It lies within the power of this Congress to do much to encourage persons to undertake rainfall observations in the higher altitudes of the different States. As regards the furnishing of instrumental equipment, I feel sure there will be no difficulty, for Professor Moore, Chief of the Bureau, has the hearty cooperation of the Honorable Secretary of Agriculture in all matters that will further the interests of irrigation.

HURRICANE IN THE GULF OF MEXICO.

By Capt. J. ELLIGERS, jr.

Mr. W. C. Devereaux, Assistant Observer, Havana, Cuba, forwards the following report by Capt. J. Elligers, jr., captain of the Norwegian steamship *Jason*, with reference to the hurricane of August 14 and 15. The exact location of the vessel is not known, other than as given in the extract from Captain Elligers's report:

We received a telegram at Tampico on August 11 from the United States Weather Bureau, stating that a hurricane was approaching the Mexican coast, but, as the following day did not show any signs of the approach of the storm and as our boat was new and well loaded, we sailed with a cargo of cattle at 2 p. m. of the 13th, direct for Havana. The weather was clear, with a light breeze from the east-northeast and a normal barometer. After midnight of the 13th the wind increased to a brisk breeze from the north-northeast. At 6 a. m. of the 14th, when we were about 150 miles east of Tampico, a gale suddenly blew up from the north, with heavy rain, the barometer began to fall rapidly, and the sea became very rough. The wind continued from the north with terrible force until 9 p. m. of that day, but seemed to be strongest between 12 noon and 4 p. m.; the rain fell in torrents, the air was sticky and much warmer than on the preceding day, and the sea was very rough. The barometer reached the lowest point at 8:30 p. m., one reading 29.24 and the other reading 29.13 (they were together before the storm). From 9 to 9:20 p. m. there was a dead calm; the rain had stopped, but the sea was terrible; the only thing I can compare it to is the boiling water in a mammoth kettle. At 9:20 p. m. the wind turned to south, through east, and the storm came with a sudden rush from that direction, and the wind blew with great force until 6 a. m. of the 15th. I can not estimate the velocity of the wind, but it was very high; I had to hold myself on the boat by clinging to a stanchion with both arms, and the wheelman had to stand in front of the wheel so that the wind would blow him against the wheel and not away from it.

During the 15th the storm gradually moderated, and on the 16th the hatches, which had been closed for three days, were opened and 270 dead cattle were removed from a cargo of 613. It was by far the worst storm I ever encountered, and I have been a sailor all my life.

Abstract of log of steamship Jason.

Date.	Barometer.		Remarks.
1903.	*Mm.*	*Inches.*	
Aug. 13, 2 p. m.	762.0	30.00	Fine weather; light breeze from ene.; left Tampico.
4 p. m.	762.2	30.01	Fine weather: light breeze from ene.
8 p. m.	762.0	30.00	Do.
14, 12 midnight.	762.0	30.00	Fine weather; fresh breeze from ene.
4 a. m.	760.0	29.92	Cloudy; strong breeze nne.
5 a. m.	760.0	29.92	Do.
6 a. m.	759.8	29.91	Heavy rain; wind north, blowing up suddenly to storm.
7 a. m.	759.5	29.90	Heavy rain; wind north; storm; heavy sea.
8 a. m	759.0	29.88	Do.
9 a. m.	758.0	29.84	Heavy rain; wind north, increasing to hurricane; heavy sea; warm and oppressive.
10 a. m.	757.0	29.80	Do.
11 a. m.	756.0	29.76	Do.
12 m.	755.0	29.72	Heavy rain; wind north, hurricane; heavy sea; warm and oppressive.
1 p. m.	752.5	29.63	Do.
2 p. m.	751.0	29.57	Do.
3 p. m.	750.0	29.53	Do.
4 p. m.	749.0	29.49	Do.
5 p. m.	747.0	29.41	Do.
6 p. m.	745.0	29.33	Do.
7 p. m	744.0	29.31	Do.
8 p. m.	743.5	29.27	Do.
8:30 p. m.	742.8	29.24	Do.
9 p. m.	743.6	29.25	Dead calm.
10 p. m.	744.5	29.31	Hurricane.
15, 12 midnight.	745.0	29.33	Do.
4 a. m.	750.0	29.53	Do.
8 a. m	759.0	29.88	Storm.
12 m.	761.5	29.98	Strong gale.

At 9 p. m. of the 14th a great calm, and then the wind turned from north through east to south. At 9:20 the cyclone came with a sudden rush from south, glass rising. Wind blew with terrible force right up to 6 a. m. of the 15th; after that time it went slowly down to storm, strong gale, and fresh breeze at 12 midnight of August 15–16. The sea was very rough at the time and there were heavy rain squalls all the time. During the hurricane the temperature of the air was about 31° Celsius, and before the hurricane it was not more than 27°–29° in the middle of the day. Sunday morning, the 16th, the wind was fresh breeze from east and the sea very moderate.

METHODS OF METEOROLOGICAL INVESTIGATION.

By W. N. SHAW, Superintendent of the Meteorological Office, London.

An address before Section A, of the British Association for the Advancement of Science, at Southport, England, September 10, 1903.

[Reprinted from the author's corrected separate print.]

In opening the proceedings of the subsection devoted to cosmical physics, which we may take to be the application of the methods and results of mathematics and physics to problems suggested by observations of the earth, the air, or the sky, I desire permission to call your attention to some points of general interest in connection with that department which deals with the air. My justification for doing so is that this is the first occasion upon which a position in any way similar to that which I am now called upon to fill has been occupied by one whose primary obligations are meteorological. That honour I may with confidence attribute to the desire of the Council of the Association to recognise the subject so admirably represented by the distinguished men of science who have come across the seas to deliberate upon those meteorological questions which are the common concern of all nations, and whom we are specially glad to welcome as members of this subsection. Their presence and their scientific work are proof, if proof is required, that meteorologists can not regard meteorological problems as dissociable from section A; that the prosecution of meteorological research is by the study of the kinematics, the mechanics, the physics, or the mathematics

of the data compiled by laborious observation of the earth's atmosphere.

But this is not the first occasion upon which the address from the chair of the subsection has been devoted to meteorology. Many of you will recollect the trenchant manner in which a university professor, himself a meteorologist, an astronomer, a physicist, and a mathematician, dealt candidly with the present position of meteorology. After that address I am conscious that I have no claim to be called a meteorologist according to the scientific standard of section A. Professor Schuster has explained—and I can not deny it—that the responsible duty of an office from which I can not dissociate myself is signing weather reports; and I could wish that the duty of making the next address had been intrusted to one of my colleagues from across the sea. But as Professor Schuster has set forth the aspect of official meteorology, as seen from the academic standpoint, with a frankness and candour which I think worthy of imitation, I shall endeavour to put before you the aspect which the relation between meteorology and academic science wears from the point of view of an official meteorologist whose experience is not long enough to have hardened into that most comfortable of all states of mind, a pessimistic contentment.

Meteorology occupies a peculiar position in this country. From the point of view of mathematics and physics, the problems which the subject presents are not devoid of interest, nor are they free from that difficulty which should stimulate scientific effort in academic minds. They afford a most ample field for the display of trained intellect, and even of genius, in devising and applying theoretical and experimental methods. And can we say that the work is unimportant? Look where you will over the countries which the British Association may be supposed to represent, either directly or indirectly, and say where a more satisfactory knowledge of the laws governing the weather would be unimportant from any point of view. Will you take the British Isles on the eastern shores of the Atlantic, the great meteorological laboratory of the world, with the far-reaching interests of their carrying trade; or India, where the phenomena of the monsoon show most conspicuously the effects of the irregular distribution of land, the second great meteorological cause, and where recurring famines still overstrain the resources of administration. Take the Australasian colonies and the Cape, which, with the Argentine Republic, where Mr. Davis is developing so admirably the methods of the Weather Bureau, constitute the only land projections into the great southern ocean, the region of "planetary meteorology." Australia, with its periods of paralysing drought; the Cape, where the adjustment of crops to climate is a question of the hour; or take Canada, which owns at the same time a granary of enormous dimensions and a large portion of the Arctic Circle; or take the scattered islets of the Atlantic and Pacific or the shipping that goes wherever ships can go. The merest glance will show that we stand to gain more by scientific knowledge, and lose more by unscientific ignorance of the weather, than any other country. The annual loss on account of the weather would work out at no inconsiderable sum per head of the population, and the merest fraction of success in the prevention of what science must regard as preventable loss would compensate for half a century of expenditure on meteorological offices. Or take a less selfish view and consider for a moment our responsibilities to the general community of nations, the advantages we possess as occupying the most important posts of observation. If the meteorology of the world were placed, as perhaps it ought to be, in the hands of an international commission, it can be no exaggeration to say that a considerable majority of the selected sites for stations of observation would be on British soil or British ships. We can not help being the most important agency for promoting or for obstructing the extension of meteorological science. I say this bluntly and perhaps crudely because I feel sure that ideas not dissimilar from these must occasionally suggest themselves to every meteorologist, British or foreign; and if they are to be expressed—and I think you will agree with me that they ought to be—a British meteorologist ought to take the responsibility of expressing them.

And how does our academic organisation help us in this matter of more than parochial or even national importance? There was a time when meteorology was a recognised member of the large physical family and shared the paternal affection of all professors of physics; but when the poor nestling began to grow up and develop some individuality, electricity developed simultaneously with the speed of a young cuckoo. The professors of physics soon recognised that the nest was not large enough for both, and with a unanimity which is the more remarkable because in some of these academic circles utilitarianism is not a condition of existence, and pure science, not market value, might be the dominant consideration—with singular unanimity the science which bears in its left hand, if not in its right, sources of wealth beyond the dreams of avarice was recognised as a veritable Isaac, and the science wherein the fruits of discovery must be free for all the world, and in which there is not even the most distant prospect of making a fortune—that science was ejected as an Ishmael. Electrical engineering has an abundance of academic representatives; brewing has its professorship and its corps of students, but the specialised physics of the atmosphere has ceased to share the academic hospitality. So far as I know the British universities are unanimous in dissembling their love for meteorology as a science, and if they do not actually kick it downstairs they are at least content that it has no encouragement to go up. In none is there a professorship, a lectureship, or even a scholarship, to help to form the nucleus of that corps of students which may be regarded as the primary condition of scientific development.

Having cut the knot of their difficulties in this very human but not very humane method, the universities are, I think, disposed to adopt a method of justification which is not unusual in such cases; indications are not wanting which disclose an opinion that meteorology is, after all, not a science. There are, I am aware, some notable exceptions; but do I exaggerate if I say that when university professors are kind enough to take an interest in the labors of meteorologists, who are doing their best amid many discouragements, it is generally to point out that their work is on the wrong lines; that they had better give it up and do something else? And the interest which the universities display in a general way is a good-humoured jest about the futility of weather prophecy, and the kindly suggestion that the improvement in the prediction of the next twenty-four hours' weather is a natural limit to the orbit of an Ishmaelite's ambition.

Under these circumstances such an address as Professor Schuster's is very welcome: it recognises at least a scientific brotherhood and points to the responsibility for a scientific standard; it even displays some of the characteristics of the Good Samaritan, for it offers his own beast on which to ride, though it recommends the unfortunate traveller to dispose of what little clothing the stripling has left to provide the two pence for the host.

It is quite possible that the unformulated opinion of the vast majority of the people in this country who are only too familiar with the meteorological vagaries of the British Isles is that the weather does just as it pleases; that any day of the year may give you an August storm or a January summer's day; that there are no laws to be discovered, and that the further prosecution of so unsatisfactory a study is not worth the time and money already spent upon it. They forget that there are countries where, to judge by their languages, the

weather has so nearly the regularity of "old time" that one word is sufficient to do duty for both ideas. They forget that our interests extend to many climates, and that the characteristics of the eastern shores of the North Atlantic are not appropriate to, say, western tropical Africa. That may be a sufficient explanation of the attitude of the man in the street, but as regards the British universities dare I offer the difficulty of the subject as a reason for any want of encouragement? Or shall I say that the general ignorance on the part of the public of the scientific aspirations and aims of meteorologists and of the results already obtained is a reason for the universities to keep silence on the subject? With all respect I may say that the aspect which the matter presents to official meteorologists is that the universities are somewhat oblivious of their responsibilities and their opportunities.

I have no doubt that it will at once be said that meteorology is supported by government funds, and that alma mater must keep her maternal affection and her exiguous income for subjects that do not enjoy state support. I do not wish just now to discuss the complexities of alma mater's housekeeping. I know she does not adopt the same attitude with regard to astronomy, physics, geology, mineralogy, zoology, or botany, but let that pass. From the point of view of the advancement of science I should like to protest against the idea that the care of certain branches of science by the state and by the universities can be regarded as alternative. The advancement of science demands the co-operation of both in their appropriate ways. As regards meteorology, in my experience, which I acknowledge is limited, the general attitude towards the department seems to be dictated by the consideration that it must be left severely alone in order to avoid the vicious precedent of doing what is, or perhaps what is thought to be, government work without getting government pay, and the result is an almost monastic isolation.

There is too much isolation of scientific agencies in this country. You have recently established a national physical laboratory, the breath of whose life is its association with the working world of physics and engineering, and you have put it—where? At Cambridge, or anywhere else where young physicists and engineers are being trained? No; but in the peaceful seclusion of a palace in the country, almost equidistant from Cambridge, Oxford, London, and everywhere else. You have established a meteorological office, and you have put it in the academic seclusion of Victoria street. Monastic isolation may have its advantages, but I am perfectly certain it is not good for the scientific progress of meteorology. How can one hope for effective development without some intimate association with the institutions of the country, which stand for intellectual development and the progress of science?

I could imagine an organisation which by association of the universities with a central office would enable this country, with its colonies and dependencies, to build up a system of meteorological investigation worthy of its unexampled opportunities. But the co-operation must be real and not one-sided. Meteorology, which depends upon the combination of observations of various kinds from all parts of the world, must be international, and a government department in some form or other is indispensable. No university could do the work. But whatever form government service takes it will always have some of those characteristics which, from the point of view of research, may be called bondage. On the other hand, research, to be productive, must be free with an academic freedom, free to succeed or fail, free to be remunerative or unremunerative, without regard to government audits or House or Commons control. Research looks to the judgment of posterity with a faith which is not unworthy of the churches, and which is not among those excellent moral qualities embodied in the controller and auditor general. *Die academische Freiheit* is not the characteristic of a government department. The opportunity which gave to the world the "Philosophiæ Naturalis Principia" was not due to the state subvention of the deputy mastership of the mint, but to the modest provision of a professorship by one Henry Lucas, of whose pious benefaction Cambridge has made such wonderful use in her Lucasian professors.

The future of meteorology lies, I believe, in the association of the universities with a central department. I could imagine that Liverpool or Glasgow might take a special interest in the meteorology of the sea; they might even find the means of maintaining a floating observatory; and when I say that we know practically nothing of the distribution of rainfall over the sea, and we want to know everything about the air above the sea, you will agree with me that there is room for such an enterprise. Edinburgh might, from its association with Ben Nevis, be desirous of developing the investigation of the upper air over our land; in Cambridge might be found the author of a book, on the principles of atmospheric physics, worthy of its Latin predecessor; and for London I can assign no limited possibilities.

If such an association were established I should not need to reply to Professor Schuster's suggestion for the suppression of observations. The real requirement of the time is not fewer observations, but more men and women to interpret them. I have no doubt that the first expression of such an organisation would be one of recognition and acknowledgment of the patience, the care, the skill, and the public spirit—all of them sound scientific characteristics—which furnish at their own expense those multitudes of observations. The accumulated readings appal by their volume, it is true, but they are, and must be, the foundation upon which the scientific structure will be built.

So far as this country is concerned, when one puts what is in comparison with what might be, it must be acknowledged that the tendency to pessimistic complaisance is very strong. Yet I ought not to allow the reflections to which my predecessor's address naturally give rise to be too depressing. I should remember that, as Dr. Hellmann said some years ago, meteorology has no frontiers, and each step in its progress is the result of efforts of various kinds in many countries, our own not excluded. In the presence of our guests to-day, some of whom know by practical experience the advantages of the association of academic liberty with official routine, remembering the recent conspicuous successes in the investigation of the upper air in France, Germany, Austria, Russia, and the United States, and the prospect of fruitful co-operation of meteorology with other branches of cosmical physics, I may well recall the words of Clough:

> Say not the struggle nought availeth ....
>   And as things have been they remain.
>
> If hopes were dupes, fears may be liars;
>   It may be, in yon smoke concealed
> Your comrades chase e'en now the fliers,
>   And, but for you, possess one field.
>
> For while the tired waves, vainly breaking,
>   Seem here no painful inch to gain,
> Far back, through creeks and inlets making,
>   Comes silent, flooding in, the main.
>
> And not by eastern windows only,
>   When daylight comes, comes in the light;
> In front, the sun climbs slow, how slowly,
>   But westward, look, the land is bright.

Official meteorologists are not wanting in scientific ambitions and achievements. It is true that Professor Hann, whose presence here would have been so cordially welcomed, left the public service of Austria to continue his services to the world of science by the compilation of his great handbook, and Snellen is leaving the direction of the weather service of the

Netherlands for the more exclusively scientific work of directing an observatory of terrestrial physics; but I am reminded by the presence of Professor Mascart of those services to meteorological optics and terrestrial magnetism that make his place as president of the International Committee so natural and fitting; and of the solid work of Angot on the diurnal variation of the barometer and the reduction of barometric observations for height that form conspicuous features among the many valuable memoirs of the Central Bureau of Paris.

Of the monumental work of Hildebrandsson in association with Teisserenc de Bort on clouds, which culminated quite recently in a most important addition to the pure kinematics of the atmosphere, I hope the authors will themselves speak. Prof. Willis L. Moore's presence recalls the advances which Bigelow has made in the kinematics and mechanics of the atmosphere under the auspices of Professor Moore's office, and reminds us of the debt of gratitude which the English-speaking world owes to Prof. Cleveland Abbe, of the same office, for his treatment of the literature of atmospheric mechanics.

If General Rykatcheff had only the magnificent climatological atlas of the Russian Empire to his credit he might well rest satisfied. Professor Mohn's contributions to the mechanics of the atmosphere are examples of Norwegian enterprise in the difficult problems of meteorology, while Dr. Paulsen maintains for us the right of meteorologists to share in the results of the newest discoveries in physics. Davis's enterprise in the far south does much to bring the southern hemisphere within our reach, while Chaves places the meteorology of the mid-Atlantic at the service of the scientific world.

Need I say anything of Billwiller's work upon the special effect of mountains upon meteorological conditions, or of the immense services of those who cooperate with Hann in the production of the Meteorologische Zeitschrift, Professor Pernter of Vienna, and Dr. Hellmann of Berlin; or of Palazzo's contributions to terrestrial magnetism? The mention of Eliot's Indian work, or of Russell's organisation of Australian meteorology, will be sufficient to show that the dependencies and colonies are prepared to take a share in scientific enterprise. And if I wished to reassure myself that even the official meteorology of this country is not without its scientific ambitions and achievements, I would refer not only to Scott's many services to science but also to Strachey's papers on Indian and British meteorology and to the official contributions to marine meteorology.

There is another name, well known in the annals of the British Association, that will for ever retain an honoured place among the pioneers of meteorological enterprise, that of James Glaisher, the intrepid explorer of the upper air, the nestor of official meteorologists, who has passed away since the last meeting of the Asssociation.

I should like especially to mention Professor Hergesell's achievements in the organisation of the international investigation of the upper air by balloons and kites, because it is one of the departments which offers a most promising field for the future, and in which we in this country have a good many arrears to make up. I hope Professor Hergesell will later on give us some account of the present position of that investigation, and I am glad that Mr. Rotch, to whose enterprise the development of what I may call the scientific kite industry is largely due, is present to take part in the discussion.

Yet with all these achievements it must be confessed that the progress made with the problems of general or dynamical meteorology in the last thirty years has been disappointing. When we compare the position of the subject with that of other branches of physics it must be allowed that it still lacks what astronomy found in Newton, sound in Newton and Chladni, light in Young or Fresnel, heat in Joule, Kelvin, Clausius, and Helmholtz, and electricity in Faraday and Maxwell. Above all, it lacks its Kepler. Let me make this clear. Kepler's contribution to physical astronomy was to formulate laws which no heavenly body actually obeys, but which enabled Newton to deduce the law of gravitation. The first great step in the development of any physical science is to substitute for the indescribably complex reality of nature an ideal system that is an effective equivalent for the purposes of theoretical computation. I can not refrain from quoting again from Plato's "Republic" a passage which I have quoted elsewhere before. It expresses paradoxically but still clearly the relation of natural philosophy to natural science. In the discussion of the proper means of studying sciences Socrates is made to say: "We shall pursue astronomy with the help of problems just as we pursue geometry; but we shall let the heavenly bodies alone if it is our design to become really acquainted with astronomy." What I take to be the same idea is expressed in other words by Rayleigh in the introduction to his "Sound." He there points out as an example that the natural problem of a sounding tuning-fork really comprises the motion of the fork, the air, and the vibrating parts of the ear; and the first step in sound is to simplify the complex system of nature by assuming that the vibrations of the fork, the air, and the ear can be treated independently. In many sciences this step is a most difficult one to take. What student of nature, contemplating the infinity of heavenly bodies and unfamiliar with this method of idealism, would imagine that the most remarkable and universal generalisation in physical science was arrived at by reducing the dynamics of the universe to the problem of three bodies? When we look round the sciences each has its own peculiar ideals and its own physical quantities; astronomy has its orbits and its momentum, sound its longitudinal vibration, light its traverse vibration, heat its energy and entropy, electricity its "quantity" and its wave, but meteorology has not yet found a satisfactory ideal problem to substitute for the complexity of nature. I wish to consider the aspect of the science from this point of view and to recall some of the attempts made to arrive at a satisfactory modification of reality. I do not wish to refer to such special applications of physical reasoning as may be involved in the formation of cloud, the thermodynamics of a mixture of air and water vapour, the explanation of optical or electrical phenomena, nor even Helmholtz's application of the theory of gravitational waves to superposed layers of air of different density. These require only conventions which belong already to physics, and though they may furnish suggestions they do not themselves constitute a general meteorological theory.

The most direct efforts to create a general theory of atmospheric circulation are those which attempt to apply Newtonian dynamics, with its more recent developments on the lines of hydrodynamics and thermodynamics. Attempts have been made, mathematical or otherwise, to determine the general circulation of the atmosphere by the application of some form of calculation, assuming only the sun and a rotating earth, with an atmosphere, as the data of the problem. I confess that these attempts, interesting and ingenious as they are, seem to me to be somewhat premature. The "problem" is not sufficiently formulated. When Newton set to work to connect the motions of the heavenly bodies with their causes he knew what the motions of the heavenly bodies were. Mathematics is an excellent engine for explaining and confirming what you know. It is very rarely a substitute for observation, and before we rely upon it for telling us what the nature of the general circulation of the atmosphere really is, it would be desirable to find out by observation or experiment what dynamical and elastic properties must be attributed to an extremely thin sheet of compressible fluid rotating about an axis with a velocity reaching 1000 miles an hour, and subject to periodic heating and cooling of a very complicated character. It would be more in consonance with the practice of other sciences to find out by observation what the general circulation is before using mathematics to explain it. What

strikes one most about the mathematical treatises on the general circulation of the atmosphere is that what is true about the conclusions is what was previously known from observation. It is, I think, clear that that method has not given us the working ideal upon which to base our theory.

Consider next the attempts to regard atmospheric phenomena as periodic. Let me include with this the correlation of groups of atmospheric phenomena with each other or with those of the sun, when the periodicity is not necessarily regular, and the scientific process consists in identifying corresponding changes. This method has given some remarkable results by the comparison of the sequence of changes in the meteorological elements in the hands of Pettersen and Meinardus, and by the comparison of the variation of pressure in different parts of the globe by Sir Norman Lockyer and Dr. W. J. S. Lockyer; as regards the earth and the sun the subject has reached the stage of productive discussion. As a matter of fact, by continuing this address I am preventing Sir Norman Lockyer from telling you all about it.

For the purpose of dealing with periodicity in any form we substitute for nature an ideal system obtained by using mean values instead of individual values, and leaving out what, from this point of view, are called accidental elements. The simplification is perfectly legitimate. Passing on to the consideration of periodicity in the stricter sense, the process which has been so effective in dealing with tides, the motions of the liquid layer, is very attractive as a means of attacking the problems of the atmosphere, because, in accordance with a principle in dynamics, to every periodic cause there must correspond an effect of the same period, although the relation of the magnitude of the effect to the cause is governed by the approximation of the natural period of the body to that of the cause.

There are two forms of the strict periodic method. One is to examine the generalised observations for periodicities of known length, whether it be that of the lunar rotations or of sun-spot frequency, or of some longer or shorter period. In this connection let me acknowledge a further obligation to Professor Schuster, for tacking on to his address of last year, a development of his work on the detection of hidden periodicities, by giving us a means of estimating numerically what I may call the reality of the periodicity. The other method is by harmonic analysis of a series of observations with the view of finding causes for the several harmonic components. I may say that the meteorological office, supported by the strong opinion of Lord Kelvin, has favoured that plan, and on that account, has for many years issued the hourly results for its observatories in the form of five-day means, as representing the smallest interval for which the harmonic analysis could be satisfactorily employed. Sir Richard Strachey has given some examples of its application, and the capabilities of the method are by no means exhausted, but as regards the general problem of dynamic meteorology harmonic analysis has not as yet led to the disclosure of the required generalisation.

I ought to mention here that Prof. Karl Pearson, with the assistance of Miss Cave, has been making a most vigorous attempt to estimate the numerical value of the relationship, direct or inverse, between the barometric readings at different places on the earth's surface. The attempt is a most interesting one as an entirely new departure in the direction of reducing the complexity of atmospheric phenomena. If it were possible to find coordinates which showed a satisfactory correlation, it might be possible to reduce the number of independent variables and refer the atmospheric changes to the variations of definite centers of action in a way that has already been approached by Hildebrandsson from the meteorological side.

Years ago, when Buys Ballot laid down as a first law of atmospheric motion that the direction of the wind was transverse to the barometric gradient and the force largely dependent upon the gradient, and when the examination of synchronous charts showed that the motion of air could be classified into cyclonic and anticyclonic rotation, it appeared that the meteorological Kepler was at hand, and the first step towards the identification of a working meteorological unit had been taken—the phenomena of weather might be accounted for by the motion and action of the cyclonic depression, the position of the ascending current, the barometric minimum. The individual readings over the area of the depression could be represented by a single symbol. By attributing certain weather conditions to certain parts of the cyclonic area and supposing that the depression travelled with more or less unchanged characteristics the vagaries of weather changes can be accounted for. For thirty years or more the depression has been closely watched, and thousands of successful forecasts have been based upon a knowledge of its habits. But unfortunately the travelling depression can not be said to preserve its identity in any sense to which quantitative reasoning can be applied. As long as we confine ourselves to a comparatively small region of the earth's surface the travelling depression is a real entity, but when we widen our area it is subject to such variations of path, of speed, of intensity, and of area that its use as a meteorological unit is seriously impaired, and when we attempt to trace it to its source or follow it to its end it eludes us. Its origin, its behaviour, and its end are almost as capricious as the weather itself.

Nor if we examine other cases in which a veritable entity is transmitted, can we expect that the simple barometric distribution should be free from inexplicable variations. We are familiar with ordinary motion, or, as I will call it, astronomical motion, wave motion, and vortex motion. Astronomical motion is the motion of matter; wave motion, the motion of energy; vortex motion, the motion of matter with energy; but the motion of a depression is merely the transmission of the locus of transformation of energy; neither the matter nor the energy need accompany the depression in its motion. If other kinds of motion are subject to the laws of conservation of matter and conservation of energy, the motion of the depression must have regard also to the law of dissipation of energy. An atmospheric disturbance, with the production of rainfall and other thermal phenomena, must comply in some way with the condition of maximum entropy, and we can not expect to account for its behaviour until we can have proper regard to the variations of entropy. But the conditions are not yet in a form suitable for mathematical calculation, and we have no simple rules to guide us. So far as meteorology is concerned, Willard Gibbs unfortunately left his work unfinished.

When the cyclonic depression was reluctantly recognised as too unstable a creature to carry the structure of a general theory, Mr. Galton's anticyclones, the areas of high pressure and descending currents, claimed consideration as being more permanent. Professors Köppen and van Bebber have watched their behaviour with the utmost assiduity and sought to find therein a unit by which the atmospheric changes can be classified; but I am afraid that even Dr. van Bebber must allow that his success is statistical and not dynamical. "High pressures" follow laws on the average, and the quantity we seek is not an average but an individual.

The question arises whether the knowledge of the sequence of weather changes must elude us altogether or will yield to further search. Is the man in the street right, after all? But consider how limited our real knowledge of the facts of atmospheric phenomena really is. It may very well be that observations on the surface will never tell us enough to establish a meteorological entity that will be subject to mathematical treatment; it may be that we can only acquire a knowledge of the general circulation of the atmosphere by the study of the upper air, and must wait until Professor Hergesell has carried his international organisation so far

that we can form some working idea therefrom of general meteorological processes. But let us consider whether we have even attempted for surface meteorology what the patience of astronomers from Copernicus to Kepler did for astronomy.

Do we yet fully comprehend the kinematics of the travelling depression; and if not, are we in a satisfactory position for dealing with its dynamics? I have lately examined minutely the kinematics of a travelling storm, and the results have certainly surprised me and have made it clear that the travelling depressions are not all of one kinematical type. We are at present hampered by the want of really satisfactory self-recording instruments. I have sometimes thought of appealing to my friends the professors of physics who have laboratories where the reading of the barometer to the thousandth of an inch belongs to the work of the "elementary class," and of asking them to arrange for an occasional orgy of simultaneous readings of the barometer all over the country with corresponding weather observations for twenty-four consecutive hours, so that we might really know the relation between pressure, rainfall, and temperature of the travelling depressions; but I fear the area covered would even then hardly be large enough, and we must improve our self-recording instruments.

Then, again, have we arrived at the extremity of our knowledge of the surface circulation of the atmosphere? We know a great deal about the average monthly distribution, but we know little about the instantaneous distribution. It may be that by taking averages we are hiding the very points which we want to disclose.

Let me remind you again that the thickness of the atmosphere in proportion to the earth's surface is not unsatisfactorily represented by a sheet of paper. Now it is obvious that currents of air in such a thin layer must react upon each other horizontally, and therefore we can not *a priori* regard one part of the area of the earth's surface as meteorologically independent of any other part. We have daily synoptic charts for various small parts of the globe, and the Weather Bureau extended these over the Northern Hemisphere for the years 1875 to 1879[1]; but who can say that the meteorology of the Northern Hemisphere is independent of that of the Southern? To settle that primary question we want a synchronous chart for the globe. As long as we are unable to watch the changes in the globe we are to a certain extent groping in the dark. A great part of the world is already mapped every day, and the time has now arrived when it is worth while to consider what contributions we can make towards identifying the distribution of pressure over the globe. We may idealize a little by disregarding the local peculiarities without sacrificing the general application I have put in the exhibition a series of maps showing what approximation can be made to an isochronous chart of the globe without special effort. We are gradually extending the possibility of acquiring a knowledge of the facts in that as in other directions. With a little additional enterprise a serviceable map could be compiled; and when that has been reached, and when we have added to that what the clouds can tell us, and when the work of the aeronautical committee has so far progressed that we can connect the motion of the upper atmosphere with the conditions at the surface, when we know the real kinematics of the vertical and horizontal motion of the various parts of a travelling storm, we shall, if the universities will help us, be able to give some rational explanation of these periodic relations which our solar physics friends are identifying for us, and to classify our phenomena in a way that the inheritors of Kepler's achievements associated with us in this section may be not unwilling to recognise as scientific.

[1] The Bulletin of International Simultaneous Meteorological Observations was published daily, with a monthly summary, from January, 1875, to December, 1883. The monthly summary alone was continued to December, 1889; it was continued in the MONTHLY WEATHER REVIEW to December, 1895, with the Atlantic Ocean storm tracks. The latter have been kept up by the United States Hydrographic Office and published on the monthly Pilot Charts to the present date. The daily weather maps for the Northern Hemisphere were published with the Bulletin from January, 1877, to November, 1883, but have been preserved in manuscript from January, 1875, to December, 1896, by the Weather Bureau, and since that date by the United States Hydrographic Office. The monthly charts of isobars, isotherms, and wind and storm tracks were published by the Weather Bureau up to December, 1889. The ten-year summary for the years 1878–1887, inclusive, was published as Bulletin A by the Weather Bureau in 1891.—[ED.]

CLIMATOLOGY OF COSTA RICA.

Communicated by Mr. H. PITTIER, Director, Physical Geographic Institute.

[For tables see the last page of this REVIEW preceding the charts.]

Notes on the weather.—On the Pacific slope the rains were very inconstant, being superior to the normal in some instances and inferior in others. In San José the pressure was markedly above the normal, while temperature was slightly low, with the exceptional minimum of 55.0° on the 25th (the lowest temperature observed heretofore in this month was 55.9°); the relative humidity was also less than the mean. The rainfall, 9.83 inches, occurred almost entirely during the afternoon hours, and was distributed pretty evenly through the month. Sunshine, 187.55 against a normal of 150.42. On the Atlantic slope the rainfall was markedly deficient on the coastal plains, and generally abundant in the valleys and mountains of the interior.

Notes on earthquakes.—September 19th, $5^h\ 33^m$ a. m., pretty strong shock NE–SW., intensity III, duration 4 seconds. September 24th, $2^h\ 53^m$, a. m., slight shock NW–SE, intensity II, duration 8 seconds.

THE HURRICANE SEASON.

By ENRIQUE DEL MONTE, Chief of Central Station, Havana, Cuba.

[Translation of a circular letter from the Central Meteorological Station of the Republic of Cuba, dated July 23, 1903.]

It is well known to all that the hurricane or cyclone season of the Antilles embraces a period variable from one year to another, and that the period of duration also varies with regard to its beginning and its ending, although the date of the latter is subject to more regularity than that of the former.

In fact in some years the cyclonic activity manifests itself in June (and even in May, as it happened in 1889), and continues until the end of October; in other years it begins in July and even in August, but terminates in October. This does not mean that every year there will be hurricanes which pass more or less near to us. Some years are recorded in which there has not been any real cyclonic activity, although this is rarely the case; thus during the past year there were no storms that properly deserved the name of hurricanes.

Up to this date the cyclonic activity has not commenced this year, nor does the upper current of the atmosphere appear to indicate that its beginning is near, although conditions may afterwards vary with relative rapidity and may almost unexpectedly inaugurate the hurricane season.

But whatever may be the date at which cyclonic activity begins, tropical hurricanes in their progress are subject to the two following empiric laws:

1. The place of formation of a hurricane is variable, being intimately connected with the time of the year in which storms originate.

2. The hurricane once formed advances in a route or trajectory that varies both with the different periods of the cyclonic activity and with geographical latitudes.

The practical generalization of the two laws we have just mentioned is due to the sagacity and perseverance of one of the highest authorities of modern times in matters relating to hurricanes of the Antilles (we allude to the deceased Father

Viñes). It is clear that there should be such laws, and in fact they are known to all who devote themselves to this study. But it is the duty of the official scientific center, of which we are now in charge, to keep all advised, and in particular seamen who navigate the hurricane region as to the practical utility of the two laws of cyclonic formation and translation which we have just enunciated.

In this matter we believe that nothing can be lost, but, on the contrary, much can be gained by repeating at this time what has long been known to many, but also perhaps unknown to some.

With respect to the first law we derive the following practical conclusions:

1. The hurricanes in August are formed generally to the eastward, very near the Cape Verde Islands. At first they move westward and a little northward, and in the neighborhood of the Windward Islands, pursue a west-northwest direction. The recurve is generally effected by these hurricanes within a zone between the meridians of New Orleans and Puerto Plata, and between 29° to 33° of north latitude.

2. The hurricanes of September originate between Barbados and St. Thomas. The recurve is generally effected between the meridians of Cape Masi (74° W.) and the State of Texas, and between the 27° and 29° of north latitude.

3. The hurricanes of the first decade of October sometimes form in the Windward Islands, or in the eastern part of the Caribbean Sea. These recurve between 23° and 26° of north latitude, in a zone limited by the meridians of Matanzas (82° W.) and Cape Catoche (88° W.). They come very close to Cuba and pass through the western provinces, or the Yucatan Channel.

Consequently the hurricanes described in the three preceding paragraphs always come to Cuba from a great distance and give us plenty of time to take the precautions necessary to diminish their ravages. It is the duty of the observers in the extreme Windward Islands to discover them and announce their formation to us. The Weather Bureau of the United States is in an excellent position to perform this service, inasmuch as during the hurricane season it keeps up, at a heavy expense, five regular stations which communicate by cable twice a day to Washington the state of the weather in the central region of storm formation.

Should any cyclones occur this year during August, September, and the early part of October, the five Weather Bureau observers just referred to will first report them, as they form what may be called pickets or outposts. During these months they will have hard work. As for ourselves we have only to be attentive and wait for the first information from them, as the Republic of Cuba does not yet possess meteorological stations outside of the island. On the other hand, however, from the date of first advice until the end of the hurricane season, the task of discovering cyclones falls altogether upon the observers who are in our zone, as the storms always originate in the vicinity of the Island of Cuba.

4. The hurricanes of the second decade of October commonly originate to the southeast of Havana, some, however, form in the neighborhood of Central America. The recurve is generally made between 20° and 23° north latitude, and in the second branch of their paths they cross the western provinces between Matanzas and Pinar del Rio.

5. The cyclones of the third decade of October originate very near to Central America. They recurve very far to the south, and in the second branch cross the western part of the island of Cuba with great and increasing velocity. These are the hurricanes that demand most attention and care, since although discovered a long time in advance yet we may within a few hours find ourselves in the very center of the storm.

Passing now to the practical generalization of the second of the laws cited at the beginning of this article, or that relative to the routes or normal trajectories of hurricanes, according to the different divisions of the period of cyclonic activity, we deem it better and more profitable to reproduce exactly the paragraphs devoted to this matter by Father Viñes in his last and celebrated work on tropical hurricanes.[1]

The law that I have just expounded (that of general routes or trajectories) indicates to seamen the most dangerous zones during the hurricane months and which zones they should endeavor to avoid as much as possible; or if they must pass through them, should try to ascertain, if possible, whether the course is clear of danger or not. If they must navigate the zones described, they should be on the watch for the first indications of a cyclone, in order to take the necessary precautions in time. Leaving the application of this law to the prudence of the mariner, as circumstances may dictate and their courses permit, I will mention several practical cases that may arise.

Sailing vessels making a voyage between South American ports and Havana in the month of August may do so through the Caribbean Sea without danger. In July and September it is also advantageous to sail through the Caribbean Sea, provided they sail in low latitudes; near the Yucatan Channel they must proceed with great care. In the month of October it is very dangerous to make the voyage via the Caribbean Sea, but it may be made to the northward of Porto Rico without probable danger until quite close to Havana.

The voyage from Havana to Spain by steamer through the new channel is not dangerous if made with care. Upon leaving Havana, through telegrams received from the Windward Islands and observations made in the island of Cuba, the captain of the ship may, in the greater number of cases, be kept informed of the best date and be assured of safety while passing through the channel. Once to the north of it, he should work to the east, sailing south of the Bermudas, and within forty-eight hours after leaving Havana he will have crossed the zone frequented by the August hurricanes and will have entered the anticyclone of the Atlantic, with the advantage that if any cyclone should reach him during his voyage, it will pass at some distance to the north, and he can utilize its winds for his voyage. The navigator may object that he will thereby lose time, but he would probably lose much more if he should meet a cyclone. There was a distinguished captain in the Lopez Line who always took this course, and he never regretted it.

Steamers that leave Havana in August for New York, and vice versa, should utilize the Gulf Stream by keeping toward the eastward or right of the current on the northward journey; and on leaving New York for Havana they should not try to avoid the current by nearing the coast of the Gulf of Charleston, but sail easterly, or on the right of the stream. This offers two advantages, the first is that they avoid the part of the route most frequented by August hurricanes, and the second is that they escape being caught between the path of the cyclone and the coast, as happened with the horrible shipwreck of the *City of Vera Cruz*. By sailing away from the stream in an easterly direction navigators have an open sea, and when a hurricane threatens them, if they see that it is going to recurve to the Gulf of Charleston, they may tack under advantageous conditions. If they see that it is recurving farther to the eastward, they can continue their voyage by following the channel, thus utilizing the winds of the cyclone.

The September hurricanes in a voyage to Spain are even easier to avoid, because they either recurve on the coast of Texas, or else recurve in Florida or its vicinty, and these can be avoided, provided that upon leaving Havana the captain knows that he has time to enter the channel without danger.

The voyage from Havana to Porto Rico and vice versa, in September, and especially at the beginning of that month, is very dangerous, because it is exactly in the path of the hurricanes. This voyage should be avoided as much as possible.

The captains of vessels leaving Santiago de Cuba for the United States in August and September, and having to enter the hurricane zone, should not sail without first ascertaining whether there are any indications of a cyclone to windward. Several ships have been saved from great damage by taking this precaution.

Finally, if the master of a sailing vessel navigating in the Gulf of Mexico in the month of October, finds himself in the eastern part of the Gulf, and detects indications of the proximity of a cyclone, he should at once head to the southwest, and if in the vicinity of the Yucatan Channel, he should sail toward the Gulf of Campeche, because these cyclones generally recurve before they pass the meridian of Cape Catoche or that of New Orleans.

[1] See B. Viñes Investigation of the Cyclonic Circulation and the Translatory Movement of West Indian Hurricanes. Weather Bureau, Washington, 1898.

NOTES AND EXTRACTS.

FIFTIETH ANNIVERSARY OF THE METEOROLOGICAL SOCIETY OF FRANCE.

[Translated from the Annuaire de la Société Météorologique de France, 1903, pp. 89-93.]

On Tuesday, June 2, 1903, the Meteorological Society of France celebrated privately the fiftieth anniversary of its foundation. At the monthly meeting which took place on that day, at 5:30 p. m., M. Violle, the president, made the following address, reviewing the origin of the society, the principal events of its existence, the tasks it has accomplished, and those which now present themselves to its activity:

The history of the society has been recently brought to your attention by my illustrious colleague, M. Georges Lemoine. I can add nothing to his masterly essay, but wish simply to render homage to the founders of the Meteorological Society of France, and, in order to make this worthy of them, I will quote the words of our regretted colleague, Renou, telling how, in the spring of 1852, wishing to publish a series of meteorological observations, carefully collected by him in Versailles, he learned that for several years past a meteorological annual had been published in that city.

Three men, without private fortune, but devoted to science, according to Renou, courageously undertook, at their own risk, this publication in the year 1848, with the generous cooperation of the publishers, Gaume Frères. These three men were Hoeghens, Martins, and Bérigny. I was not acquainted with them. I hastened to Versailles. They told me that, notwithstanding all their devotion, they could not continue so onerous a publication. I expressed to them the regret that such a decision caused me, but at the same time indulged the hope that the necessary funds might be procured by founding a meteorological society, and I proposed to present them to Charles Sainte-Claire Deville, after having previously conferred with him. This I did. Charles Sainte-Claire Deville received the proposition warmly and promised to take an active interest in it. He called to his aid Bravais and d'Abbadie, and on August 17, 1852, a successful appeal was made to the scientific world.

One hundred and forty-four persons responded to the invitation of the founders. Among these were Babinet, Becquerel, Elie de Beaumont, Belgrand, Brongniard, Chatin, Daubrée, Dumas, Geoffrey Saint Hilaire, Milne Edwards, Pouillet, Ritter, and, soon afterwards, Le Verrier, to cite only the most illustrious.

The first meeting, where the constitution of the society was adopted, took place December 14, 1852. Bravais was president and Charles Sainte-Claire Deville secretary. After three other preparatory meetings, on February 15, 1853, the society inaugurated its scientific sessions, which, as the proceedings show, were already of great interest.

The history of the society is contained in its annual volumes, the fiftieth of which has just been published. There all the acts of its civil existence may be followed, from its birth up to the time of its declaration of public utility (May 26, 1869), and thence to the time of its golden jubilee, which we celebrate to-day. As to its scientific life, this is attested by the numerous and learned memoirs with which M. Georges Lemoine recently entertained you, as well as by the series of observations collected with unceasing care at nearly every point in France.

The series of observations previous to the year 1878 must be sought in our annual volumes, since it was in that year, thanks in great part to the efforts of the Meteorological Society and of its zealous president, Herve Mangon, that the Central Meteorological Bureau of France was established. One of its duties is to centralize and publish these observations, and the scrupulous exactness with which this laborious task is to-day accomplished gives a special interest to the long series of observations at Versailles, which are of such great utility as a control for the values obtained in Paris. Again, it is in our annual volumes that the first series of the precise observations made at Parc Saint Maur since 1872 are to be found. Being desirous of collecting all the data—those given by ordinary instruments as well as those furnished by the phenomena of vegetation—the society published, in addition, each year from 1868 until the establishment of the Central Bureau, a volume of meteorological items (nouvelles), which contains valuable information for the history of the time.

But perhaps the most important service that our society has rendered to science is its unceasing effort to obtain accurate observations. The utility of pursuing, beyond certain limits, data of temperature and barometric pressure may be disputed; but the person who makes the observations is certainly bound to give to them all possible accuracy. From the publication of the first annual volume, the attention of the observers has been earnestly directed to this point; and during fifty years Renou has made active warfare against bad observations. To him are due the first meteorological instructions which were published at the expense of the Meteorological Society in 1855, and which still remain a standard even after the remarkable instructions marked out by M. Angot.

The society will continue to maintain among its members a bond of esteem and sympathy; it will publish their works with gratitude and faithfully record their observations. Devoted equally to works requiring many years and to new ideas it will faithfully prosecute the fundamental observations which seem to be as necessary to meteorology as to astronomy and will courageously follow such paths of activity as offer themselves.

There are certain questions which are of special interest:

(1) The decrease of temperature with altitude in our atmosphere, only vaguely appreciated up to this time, but which now seems clear to us in its essential features, up to heights of ten or fifteen kilometers, thanks to the valuable researches of our colleague, M. Teisserenc de Bort. The results already obtained are a sure guarantee of progress in the future.

(2) The general circulation of the atmosphere as to which a real inspiration had enlightened us as far as the information collected at the surface of our globe allowed, is now placed clearly before our eyes by the methodical observations of the clouds and the direct determination of the upper currents.

(3) Is it necessary that I should tell you of the rôle played in these studies by mountain observatories, balloons, and kites? The advantages that meteorology will derive from the exploration of the upper atmosphere are fully as great as those offered to geology by delving into the deep mines. However important the mountain observatories may be it is certain that the influence of the surface of the earth modifies the atmospheric phenomena to a certain extent. Neither the wind, the temperature, nor the electric condition appear as they would at the same elevation above a vast plain. Both the balloon and the kite avoid this objection almost entirely and enable us to make actual soundings in the free atmosphere at much greater heights than can be attained by even the most elevated observatories. The repetition of the soundings at the same place and their agreement at different points, furnish a control which formerly seemed reserved to stationary observatories established in order to secure direct observations at a permanent location.

The success of these explorations of the atmosphere inspires the desire to ascend higher and higher. So many are the problems that are luring us up.

(4) We know to-day beyond all manner of doubt that there

are certain light gases which, although nearly absent from the surface of the ground, prevail in the upper strata. What is the composition of the air at different elevations?

(5) We know that an intense ionization is produced by the solar rays and is extinguished in the upper atmospheric strata. What are the consequences of this phenomenon? Is the key to the storms to be found in it?

(6) At the same time the solar radiation appears to us as manifestly the direct cause of all the phenomena. Its study imposes itself upon us as the surest means of determining the true nature of our sun. Is it a variable star? Is it continually decreasing? These questions are of the first importance for the very existence of our planet.

From a nearer point of view, is it not evident that if we knew certainly the laws of this complex radiation, and the manner in which it acts upon our atmosphere, we could deduce from this the weather conditions at a certain fixed time? And this assuredly is the real problem of meteorology.[1]

There is plenty of work for everyone, my dear colleagues. Each of us should do his best on the problems which interest him most and should make every effort to maintain for the Meteorological Society of France the high reputation which it has acquired during the first fifty years of its existence.

METEOROLOGY AT WILLIAMS COLLEGE, MASSACHUSETTS.

Mr. Willis I. Milham, Director of the Field Memorial Observatory, Williams College, Williamstown, Mass., states that observations have been taken at that place since 1816. The records for the first twenty-two years and the last twenty years are in good condition, but those for the other years are either missing or very imperfect. Systematic instruction in meteorology is also given in the college. Last year lectures on this subject were given for three weeks in connection with the course on descriptive astronomy. This year there will be a half-year course, three times a week, on meteorology and eight or ten men will elect this course, which it is hoped will become a permanent feature.

IS THERE A SEVEN-YEAR CYCLE IN RAINFALL IN ILLINOIS?

In the Tenth Report of the State Entomologist of the State of Illinois, or the Fifth Annual Report of Dr. Cyrus Thomas, dated December 30, 1880, and printed in the Transactions of the Department of Agriculture of the State of Illinois for the year 1880, Dr. Thomas has an extensive article (pp. 47-59), on the relation of meteorological conditions to insect development. By combining the records from stations in Illinois and neighboring portions of Iowa and Missouri, beginning with the record at Athens in 1840 and including Augusta, Chicago, Dubuque, St. Louis, and other stations not mentioned, but rejecting Cairo and the early records at Sandwich, Dr. Thomas compiled a table and diagrams giving the monthly and annual total rainfall and average temperature, both of which showed systematic cycles of seven years each.

[1] If the complex radiation from the sun has any variations in its complexity or its intensity, these will probably exert corresponding influences on the earth's atmosphere and the weather experienced at any station. Now we observe that our weather is extremely variable, from hour to hour and day to day, without any accompanying appreciable variation in the solar radiation. It is, therefore, evident that our weather conditions at any moment are subject to a large range of variability due to changes in our own atmospheric conditions occurring under the influence of a constant solar radiation. We have not yet been able to explain the character and extent of these variations, but there is every evidence that they are the mechanical and physical phenomena proper to the earth's atmosphere itself. We are not yet in a position that warrants us to believe that if we knew the variations in the solar radiation we could deduce or predict weather conditions any better than when the radiation is uniform and constant.—*C. A.*

We do not know the method adopted in compiling these tables of averages. The published Table, 3, Average Monthly Rainfall of Illinois for 1854-1877, would be very valuable for climatological study if we could feel sure that each figure represents the average for the whole State, computed by a uniform method throughout the table. But from the fact that Dr. Thomas mentions that for the year 1872 he had only the record for one doubtful station, we infer that all of his averages are formed by combining whatever stations were available without taking account of certain principles recognized by modern climatology. As these principles are liable to be neglected by other students, we recapitulate them as follows:

1.—When several stations have records for different groups of years and are to be combined together into one general average of many years, we must eliminate the differences between the records, depending on the differences in the exposure of the gages and in the kinds of gages, as also those depending upon the distances of the stations from each other and also those depending on the monthly and annual irregularities in rainfall.

2.—The effects of exposure and location at the same locality can ordinarily be best determined by comparing records taken at the same time at the two stations or gages.

3.—If several stations are combined in order to form a mean for any one month or year, then those same stations must appear in every other monthly or annual mean that is to be compared with the former, in order to eliminate chronological variations. In order to secure monthly or annual means for this latter purpose, when no observed record is at hand, one must interpolate geographically between neighboring stations. In this way every monthly mean becomes comparable with the others because it depends upon the same stations. Thus, also, the general averages for different parts of a State will depend upon the same fundamental period of years.

4.—In general, it is most convenient to reduce each observed monthly and annual value to ratios or statements of percentages, adopting the average annual rainfall as the divisor.

It is only when we have many stations thus corrected for chronological and geographic irregularities that we are properly prepared to begin the search for cycles or other systematic changes. The values for successive years, as published in Dr. Thomas's table, are not sufficiently homogeneous to allow of basing on them any study into secular periodicity of precipitation.

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. C. F. von Herrmann, Section Director, Raleigh, N. C., has been detailed by order of the Chief of Bureau to respond to the request for instruction in meteorology at the Agricultural and Mechanical College at West Raleigh. According to the preliminary schedule forwarded by Mr. von Herrmann, the senior class will receive a full course of instruction, using Waldo's Elementary Meteorology as the basis. The recitations will occupy one hour each week during the college term of thirty-six weeks. An additional course of lectures will also be delivered covering the following topics:

1. The atmosphere: Composition, density, arrangement, physical properties, etc.
2. The temperature of the atmosphere.
3. The temperature of the atmosphere with reference to the climates of the earth.
4. The pressure of the air.
5. The moisture of the air, its condensation into frost, dew, fog, clouds, etc.
6. Precipitation.
7. Winds and the general circulation.

8. Weather: Cyclones and anticyclones.
9. Local storms: Thunderstorms, tornadoes, subtropical storms.
10. Climate.
11. The climate of North Carolina.
12. The work of the National Weather Bureau.
13. The history and literature of meteorology.
14. Practical work: Observing, charting data, map study, and forecasting.

It is very desirable that the students be required to do some actual work of observation, reducing the records, and filling up the form used by the Weather Bureau. Instruments should be furnished for this purpose. Every agricultural college should maintain several rain gages and thermometers in different locations so as to study and appreciate the variations of rainfall and temperature that affect the growth of plants and the development of noxious insects, fungi, etc.

Mr. George Reeder, Observer, Fort Worth, Tex., reports that the class in physical geography of the Fort Worth University, under Prof. M. J. Iorns, visited the office September 29 and spent an hour receiving instruction relative to the instruments and methods of the Weather Bureau.

Mr. F. P. Chaffee, Section Director, Montgomery, Ala., reports that, on September 29, he lectured before the students and teachers of the Southern Industrial Institute at Camp Hill (Dr. Lyman Ward, President) on the Weather Bureau and its benefits to the country.

Mr. J. R. Weeks, Observer, Macon, Ga., writes as follows:

I have the honor to respectfully report that I have endeavored during my stay here to educate the public of this vicinity in meteorological matters by lectures and otherwise, at much personal expense and inconvenience. However, it is slow work. * * * A gratifying increase in the use of the daily weather map, for purposes of instruction in the public schools of this section, has been noted during the past two years and the work of this office has considerably increased. To facilitate educational interest in the work, I have recently purchased a stereopticon, prepared a number of slides and purchased others from Doctor Fassig. Educational work is done outside of my regular office hours and duties, which are numerous, as I have no assistant.

All intelligent citizens must heartily sympathize with Mr. Weeks in his struggle to enlighten the public of a State in which an unusual number of so-called weather almanacs, such as Hicks's, Greer's, Dunne's, Gathright's, Ayer's, and others are circulated and where even some of the colleges and influential newspapers apparently indorse the astrological or fakir method of making weather predictions. The daily weather map is printed and published by the Government and distributed quite gratuitously for the purpose of enabling any one to make his own predictions of the coming weather, in case he does not care to rely upon the official predictions of the Weather Bureau. We invite our fellow citizens everywhere, and especially the farmers, to take a more active intelligent view of the daily weather maps. See that they are displayed daily at your nearest post-office; borrow the back numbers and study them. Observe how the weather changes move over the surface of the country and learn to realize that your weather is not controlled by the stars, planets, or signs of the zodiac, but comes to you from some neighboring region just as naturally as a flood rolls down a river valley. Keep a record of the weather at your location and of the long-range predictions of the almanac, and consider whether you will do better to regulate important business transactions by the almanac or by the weather map.

Mr. Charles E. Ashcraft, jr., Assistant Observer in charge of the Weather Bureau station at Cheyenne, Wyo., reports that on September 23 he addressed the senior class of the local high school on the objects and practical working of the United States Weather Bureau.

THE NEW WEATHER BUREAU STATION IN YELLOWSTONE PARK, WYO.

The following extract from memorandum No. 183, October 12, 1903, will interest meteorologists and the public:

As soon as practicable a regular meteorological station of the Weather Bureau will be established at Yellowstone Park, Wyo., of model A, with Mr. John N. Ryker, Observer, in charge. Both a. m. and p. m. observations will be taken.

Temperature and rainfall stations will be established at the Lake, which is about one half day's ride from the Springs, and 7800 feet above sea level. Captain Pitcher, Superintendent of the Park, has offered to have the noncommissioned officer at the Lake take readings and telegraph them daily to the observers at the Springs. The observations taken at the Springs will be put on the circuit. Observations from the Lake will be mailed to Cheyenne.

Observations will be telegraphed from June 1 to September 30, inclusive, and be distributed extensively throughout the circuits, so that they may appear on many maps and bulletins of the Weather Bureau. There will be telegraphed to the observer each morning during the period above mentioned by special message from Chicago, the 8 a. m. and maximum temperatures from 50 stations of the service, so selected as to represent fairly the whole service. The reports from these stations will, by cooperation with the different hotels of the Park, be entered on bulletin boards displayed in the office or veranda of each hotel; the boards to be furnished by the proprietors of the hotels and to be prepared under the supervision of the observer, who will see that they are properly lettered and will request the proprietors to have the data entered thereon each morning. The observer will make a tour of the Park and provide for the prompt and efficient cooperation of the managers of the different hotels in the receipt of these reports and the prompt posting thereof.

The observer may establish voluntary stations at any or all military patrol stations. The readings will be taken in accordance with the orders issued by the Superintendent of the Park.

SUN SPOTS AND WEATHER.

The following telegrams should be noted by all readers of the MONTHLY WEATHER REVIEW and should be disseminated widely, at least in substance:

PHILADELPHIA, PA., *November 2, 1903.*

To Prof. WILLIS L. MOORE,
Chief U. S. Weather Bureau, Washington, D. C.

Will esteem it a favor if you will telegraph us a communication pointing out the very indefinite relation of great disturbances in the sun and terrestrial storms, which is shown by the fact that the great magnetic disturbances now occurring have no immediate effect on American weather which varies with locality and, over the eastern part of the United States, has been more or less quiescent for some time. A dispatch of this kind seems to me worth while in view of wrong inferences and the confusion of magnetic storms, so called, with weather disturbances.

(Signed) H. M. WATTS.

WASHINGTON, D. C., *November 2, 1903.*

Mr. H. M. WATTS,
The Press, Philadelphia, Pa.

The exact connection between solar action as registered in outbursts of sun spots and terrestrial magnetic storms is still under investigation, and till that connection is fully understood there is no need to make attempt to state what the relations are between the two sets of phenomena. At present the proof is strong that taking year by year, the change in solar energy from the average is accompanied by similar variations in pressure and temperature. The polar regions of the sun show such turbulent action more than the equatorial, and hence the prominence frequency is a more sensitive index than the sun spots of lower latitudes. What is the connection between an outpouring of solar energy as shown in prominence eruptions, magnetic disturbances, and other symptoms, and the corresponding effect on the circulation of the atmosphere taken as a whole, is a problem which is just being taken up intelligently. At present it is a matter of conjecture rather than of definite knowledge. We therefore prefer to postpone any special opinions on this interesting topic till science has more fully solved the questions at issue. To identify an individual solar spot and a terrestrial cyclone is such crude science as to call for no serious comment, although it is very common for an individual to seek to answer cosmical questions by the state of the sky over his own town.

(Signed) WILLIS L. MOORE,
Chief U. S. Weather Bureau.

SMALL LIGHTNING DISCHARGES BETWEEN THE RAINDROPS.

Mr. Fred. M. Taylor, Postmaster, Titusville, Fla., reports that on September 17, during a thundershower shortly after sunset, each electric discharge was accompanied by small typical strokes of only a few inches in length between neighboring rain drops. These were synchronous with the main discharge and when they struck the hands or face produced a sharp stinging sensation.

OLD WEATHER RECORD AT FAIRMOUNT, ONONDAGA COUNTY, N. Y.

We desire to again call attention to the record of temperature kept at Fairmount, Onondaga County, N. Y., since 1800. This record is referred to on page 296 of the Transactions of the New York State Agricultural Society for the year 1859. If any one can discover what has become of this record and see that it is made accessible to meteorologists, he will be doing a good work. Some extracts referring to this record were published in the MONTHLY WEATHER REVIEW for September, 1897, page 398.

HURRICANE ON SEPTEMBER 11 IN THE BAHAMAS.

Mr. Arthur S. Haigh, living at Cat Cay, in the Bahamas, latitude 25° 33′ north; longitude 79° 19′ west, writes as follows:

A hurricane passed here on September 11, and there being no weather station within 60 miles or so, a few details may be of interest to the Weather Bureau. On the night of the 10th the wind was squally from east, with some rain; barometer 29.80 at 10 p. m. At 6 a. m. on the 11th barometer was at 29.50; wind a full gale from northeast, which increased to hurricane force by 8:30 a. m.; barometer 29.20 and falling rapidly. From 10 to 10:30 a. m. barometer stood at 28.82; between 10:30 and 11 a. m. the wind dropped a good deal and went round by north to southwest, from which quarter shortly after 11 a. m. it blew harder than ever; barometer slowly rising. After 1 p. m. the wind gradually decreased; by 4 p. m. barometer had risen to 29.50 and at 6 p. m. to 29.80—storm practically over.

Rainfall for twenty-four hours ending 6 p. m. September 11 was 0.84 inch. The barometer had been about two tenths below normal for several days, which is not unusual here at this time of year, but beyond that I had no warning.

THE WEATHER OF THE MONTH.

By Mr. W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart IV and the average values and departures from normal are shown in Tables I and VI.

The mean barometric pressure was above 30.00 inches from the central parts of Texas, Oklahoma, and Kansas, southeastern Nebraska, western Iowa, northwestern Wisconsin, and central upper Michigan eastward to the Atlantic Ocean, with the crest over central North Carolina, Virginia, West Virginia, District of Columbia, Maryland, Delaware, and southern New Jersey, in which region the mean pressure was from 30.15 to 30.19 inches.

Over western New Mexico, Arizona, and eastern and the central valleys of California the mean pressure was 29.90 inches or lower, with a minimum mean monthly of 29.80 inches at Yuma.

The mean pressure was below the normal in Minnesota generally, eastern and southern South Dakota, Nebraska, western Kansas, western Texas, southern Wyoming, Colorado, New Mexico, northeastern Arizona, Utah, central Nevada, and north-central California; elsewhere it was above the normal.

In the area of minus departures the change in no instance equaled —.05 inch, while in the greater portion of the regions of plus departures the changes ranged from +.05 to +.13 inch, the maximum changes occurring over western Virginia and eastern West Virginia.

The pressure increased over August, 1903, except in southern Florida, northwestern upper Michigan, northern Minnesota, eastern North Dakota, and north-central Montana.

The minus departures were very slight, not exceeding —.02 inch. Generally the plus departures were very decided, with changes of +.10 inch to +.15 inch over portions of the northern and middle Plateau regions, and from northeastern Arkansas eastward to the Atlantic Ocean, and from eastern Missouri northeastward over the lower Lake region and thence eastward over southern New England to the Atlantic. Over eastern Kentucky, the southern parts of Ohio, Pennsylvania, and New Jersey, the District of Columbia, Maryland, Delaware, Virginia, West Virginia, and northern North Carolina the changes ranged from +.15 to +.20 inch, with the greatest change over northeastern West Virginia.

TEMPERATURE OF THE AIR.

The distribution of maximum, minimum, and average surface temperatures is graphically shown by the lines on Chart VI.

The temperature was above the normal in New England, the Ohio Valley and Tennessee, lower Lake region, and the middle and south Pacific districts, and below the normal in all other districts.

As will be seen by the subjoined table, the plus departures exceeded +1.0° in but one district, while the minus departures were —1.0°, or more, in ten districts; —2.0°, or more, in four districts; —3.0°, or more, in two districts, and —4.0°, or more, in one district.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	61.2	+ 0.5	+ 4.9	+ 0.5
Middle Atlantic	12	66.7	— 0.3	+ 7.5	+ 0.8
South Atlantic	10	72.5	— 0.8	+ 3.9	+ 0.4
Florida Peninsula *	8	78.9	— 0.2	+ 5.8	+ 0.6
East Gulf	9	74.4	— 1.0	— 7.7	— 0.9
West Gulf	7	75.2	— 0.8	—11.0	— 1.2
Ohio Valley and Tennessee	11	69.6	+ 0.8	+ 4.0	+ 0.4
Lower Lake	8	64.4	+ 1.2	+ 8.9	+ 1.0
Upper Lake	10	58.9	— 0.3	+10.6	+ 1.2
North Dakota *	8	52.2	— 4.9	— 2.9	— 0.3
Upper Mississippi Valley	11	64.0	— 1.0	+ 4.0	+ 0.4
Missouri Valley	11	62.6	— 2.6	— 0.7	— 0.1
Northern Slope	7	55.4	— 2.8	— 3.9	— 0.4
Middle Slope	6	66.0	— 1.7	— 6.6	— 0.7
Southern Slope *	6	70.9	— 1.4	—10.4	— 1.2
Southern Plateau *	13	67.2	— 1.9	—13.2	— 1.5
Middle Plateau *	8	57.8	— 3.4	—24.0	— 2.7
Northern Plateau *	12	55.7	— 1.6	+ 0.1	0.0
North Pacific	7	57.0	— 0.1	— 3.6	— 0.4
Middle Pacific	5	63.4	+ 0.5	— 8.1	— 0.9
South Pacific	4	68.7	+ 0.4	— 5.1	— 0.6

* Regular Weather Bureau and selected voluntary stations.

In Canada.—Prof. R. F. Stupart says:

The mean temperature of the month was lower than the average over the mainland of British Columbia, throughout the Northwest Territories, in Manitoba, and in Ontario north of the Great Lakes, the largest negative departure, about 6°, being in British Columbia and Saskatchewan. In the Territories, in only three of the past twenty years has the September mean been as low as during the month just closed. From Lake Huron eastward over Ontario, Quebec, and the Maritime Provinces, the mean was very nearly average, but a positive departure of about 1° was fairly general.

East of the Mississippi Valley, except in New York, about central Lake Ontario, the departures, whether plus or minus,

did not equal 2.0°, while over portions of the Plateau and slope regions, North Dakota, and the upper Missouri Valley they ranged from −2.0° to −6.4°, the region of maximum departures overlying central Wyoming and the western portions of the Dakotas, the greatest departure, −6.4°, being reported from Rapid City, S. Dak.

Maximum temperatures of 90°, or higher, were reported from the southern portions of the South Atlantic States, the Gulf States, Ohio Valley and Tennessee, western portion of the lower Lake region, southern portions of the upper Mississippi and Missouri valleys, portions of the middle and northern slope and northern Plateau regions, the middle and southern Plateau and southern slope regions, and California, except at some coast stations. Maximum temperatures of 100°, or higher, occurred in northeastern Alabama, southwestern Oklahoma, northwestern and west-central Texas, southwestern New Mexico, western Arizona, extreme southern Nevada, and the valleys of southeastern California; and maximum temperatures of 110° to 116° in southeastern California, extreme southern Nevada, and western Arizona.

Freezing temperatures occurred in portions of New England, New York, Pennsylvania, the Lake region, upper Mississippi and upper Missouri valleys, North Dakota, and the slope and Plateau regions.

PRECIPITATION.

The distribution of total monthly precipitation is shown on Chart III.

The precipitation was normal in the northern Plateau, and south Pacific districts; below the normal in the Atlantic, and Gulf States, Ohio Valley and Tennessee, lower Lake region, the middle slope, and middle Pacific districts, and above the normal in the remaining districts.

In central and southern Florida, except in the extreme southern portion, and in east central Georgia, the precipitation was above the normal, and markedly so on the southeast coast of Florida where it amounted to + 6.3 inches at Jupiter. Marked excesses in precipitation also occurred in the valleys of the upper Mississippi, and Red River of the North, parts of the central Mississippi Valley, in north-central Texas, where it amounted to + 6.2 inches at Abilene, and in western Texas, and central and eastern Arizona, where the departures ranged from + 2.4 inches at El Paso, to + 3.8 inches at Flagstaff. The greatest deficiencies in precipitation were reported from western Kentucky, Tennessee, western Alabama, eastern Mississippi, the western parts of Louisiana and Arkansas, the Texas coast, extreme southeastern Virginia, District of Columbia, Maryland, central Pennsylvania, and New York, except the extreme southeastern portion, where they ranged from — 2.0 inches to — 4.3 inches.

SNOW.

Snow occurred at most of the higher stations of the Rocky Mountain region from Colorado northward to the British Possessions, during the passage of the storms from the 11th to 15th, over that region, and extended into the lower levels of the western portions of the Dakotas, and northwestern Nebraska. Snow also occurred over the Upper Michigan Peninsula, and at scattered points in the northern parts of New York and New England.

HAIL.

The following are the dates on which hail fell in the respective States:

Arizona, 5, 8, 20, 23, 24, 28, 30. Arkansas, 15, California, 12, 30. Colorado, 6, 11, 24, 28, 29. Connecticut, 5, 27. Florida, 2, 18. Georgia, 2, 3. Idaho, 7, 8, 12, 13, 14. Illinois, 14, 17. Indiana, 5. Iowa, 11, 13, 17. Kansas, 8, 9, 11, 26. Louisiana, 16. Maine, 4, 5, 7, 27. Maryland, 27. Massachusetts, 5, 27. Michigan, 2, 9, 17, 18, 24, 27. Minnesota, 1, 2, 3, 8, 12, 13, 14, 15. Mississippi, 16. Missouri, 8, 9, 26. Montana, 5, 7, 10, 25. Nebraska, 7, 9, 11, 13. New Hampshire, 5, 7, 27, 29. New Jersey, 5, 27. New Mexico, 11, 12, 27, 28. New York, 4, 5, 24, 27, 28. North Carolina, 5. North Dakota, 8. Ohio, 8, 10. Oregon, 10. Pennsylvania, 5, 27. South Dakota, 3, 4, 7, 13, 14. Texas, 14, 16, 24, 30. Utah, 1, 6, 11, 14, 28, 30. Virginia, 27. Washington, 14. Wisconsin, 2, 3, 17. Wyoming, 5, 6, 10, 25, 29.

SLEET.

The following are the dates on which sleet fell in the respective States:

Colorado, 11, 13, 14, 15, 26. Michigan, 16, 17. Minnesota, 13. Montana, 10, 12, 13, 14. North Dakota, 12, 13, 15, 16. South Dakota, 13, 16. Utah, 11, 14. Washington, 14. Wisconsin, 17. Wyoming, 7, 8, 13.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	8	1.57	50	−1.6	−1.2
Middle Atlantic	12	2.05	55	−1.7	0.0
South Atlantic	10	3.48	69	−1.6	−0.8
Florida Peninsula *	8	9.16	118	+1.4	+6.0
East Gulf	9	1.38	37	−2.4	−2.9
West Gulf	7	1.83	45	−2.2	+0.1
Ohio Valley and Tennessee	11	0.89	31	−2.0	−5.0
Lower Lake	8	1.86	63	−1.1	+2.2
Upper Lake	10	3.96	114	+0.5	+1.4
North Dakota *	8	3.08	261	+1.9	−1.4
Upper Mississippi Valley	11	4.45	137	+1.2	+1.6
Missouri Valley	11	3.06	124	+0.6	+3.9
Northern Slope	7	1.50	150	+0.5	+1.1
Middle Slope	6	1.15	66	−0.6	+0.1
Southern Slope *	6	2.68	104	+0.1	−1.2
Southern Plateau *	13	1.72	210	+0.9	+0.9
Middle Plateau *	8	0.97	126	+0.2	−0.2
Northern Plateau *	12	1.04	100	0.0	−3.0
North Pacific	7	3.04	103	+0.1	−6.6
Middle Pacific	5	0.06	8	−0.7	−4.4
South Pacific	4	0.11	100	0.0	+0.4

* Regular Weather Bureau and selected voluntary stations.

In Canada.—Professor Stupart says:

The precipitation was considerably in excess of the average in British Columbia, and in excess to a lesser extent in Manitoba, northern Ontario, Prince Edward Island, and Nova Scotia. In southern Ontario and in Quebec there was a marked deficiency, while in the Northwest Territories the departures from average were not pronounced, and in some localities were positive and in others negative.

SUNSHINE AND CLOUDINESS.

The cloudiness was normal in the Florida Peninsula, below the normal in the Atlantic and Gulf States, Ohio Valley and Tennessee, and the lower Lake and middle Plateau regions, and above the normal in the remaining geographic districts. Some of the departures, both plus and minus, were quite marked.

The percentage of sunshine was 70 per cent or more in southern Kentucky, Tennessee, western Alabama, Mississippi, eastern and central Louisiana, southeastern Texas, the western parts of Arizona and New Mexico, Nevada, and California, except the extreme southwestern and northwestern parts.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographic districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the following table:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	4.0	— 1.0	Missouri Valley	4.9	+ 0.9
Middle Atlantic	4.0	— 0.8	Northern Slope	4.7	+ 0.7
South Atlantic	4.2	— 0.6	Middle Slope	3.7	+ 0.5
Florida Peninsula	5.5	0.0	Southern Slope	4.2	+ 0.6
East Gulf	2.9	— 1.5	Southern Plateau	3.3	+ 0.7
West Gulf	3.7	— 0.6	Middle Plateau	2.8	— 0.1
Ohio Valley and Tennessee	3.2	— 1.2	Northern Plateau	4.3	+ 0.2
Lower Lake	4.0	— 0.8	North Pacific	5.5	+ 0.6
Upper Lake	5.6	+ 0.5	Middle Pacific	3.1	+ 0.3
North Dakota	5.5	+ 1.2	South Pacific	3.0	+ 0.5
Upper Mississippi Valley	4.4	+ 0.2			

HUMIDITY.

The relative humidity was normal in the upper Lake and south Pacific districts; below the normal in New England, South Atlantic and Gulf States, Florida Peninsula, Ohio Valley and Tennessee, and the north and middle Pacific districts, and above the normal elsewhere; as a rule, the plus departures were larger than the minus ones, over the several districts, and especially so in North Dakota, and the northern slope district.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	79	— 2	Missouri Valley	70	+ 4
Middle Atlantic	79	+ 2	Northern Slope	64	+ 9
South Atlantic	78	— 2	Middle Slope	60	+ 2
Florida Peninsula	79	— 3	Southern Slope	65	+ 5
East Gulf	71	— 5	Southern Plateau	42	+ 3
West Gulf	72	— 2	Middle Plateau	43	+ 5
Ohio Valley and Tennessee	69	— 3	Northern Plateau	55	+ 7
Lower Lake	74	+ 1	North Pacific	78	— 2
Upper Lake	77	0	Middle Pacific	60	— 5
North Dakota	75	+ 9	South Pacific	66	0
Upper Mississippi Valley	76	+ 4			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 3155 thunderstorms were received during the current month as against 2641 in 1902 and 7174 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country was most numerous were: 27th, 253; 8th and 9th, 236; 5th, 232; 10th, 237.

Reports were most numerous from: Missouri, 333; Iowa, 217; Illinois, 190; Nebraska, 141.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: 2d to 10th.

In Canada: Thunderstorms were reported at St. John, N. B., 5, 28. Halifax, 5, 6. Grand Manan, 5, 28. Yarmouth, 28. Quebec, 4, 10. Montreal, 4, 10, 27. Bissett, 15, 16. Ottawa, 10. Kingston, 4. Toronto, 22. White River, 3, 23. Port Stanley, 4, 8, 9, 10, 13. Saugeen, 9, 10, 27. Parry Sound, 10, 12, 15, 16, 23. Port Arthur, 3, 8, 9. Minnedosa, 19, 20, 23, 29, 30. Qu'Appelle, 6. Medicine Hat, 6. Swift Current, 6. Hamilton, Bermuda, 7.

Auroras were reported from Grand Manan, 20, 22, 23. Yarmouth, 23. Quebec, 19, 22, 29. Montreal, 19, 22. Kingston, 29. Toronto, 4. Port Stanley, 19. Minnedosa, 1, 3. Qu'Appelle, 19. Swift Current, 23. Edmonton, 20, 25. Prince Albert, 29.

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Atlantic City, N. J	16	60	se.	Mount Tamalpais, Cal	12	75	nw.
Buffalo, N. Y	27	60	w.	New Haven, Conn	16	60	s.
Cape Henry, Va	15	54	nw.	New York, N. Y	16	63	e.
Chicago, Ill	12	51	s.	Do	17	65	nw.
Columbus, Ohio	10	60	w.	North Head, Wash	11	72	nw.
Hatteras, N. C	15	60	nw.	Do	12	56	nw.
Jupiter, Fla	11	78	ne.	Point Reyes Light, Cal	6	58	nw.
Do	12	60	e.	Do	7	57	nw.
Kittyhawk, N. C	15	72	ne.	Do	11	61	nw.
Modena, Utah	5	60	sw.	Do	12	75	nw.
Moorhead, Minn	12	51	sw.	Do	13	53	nw.
Mount Tamalpais, Cal	3	50	nw.	Do	23	57	nw.
Do	4	58	w.	Southeast Farallon, Cal	12	58	nw.
Do	5	56	nw.	Do	13	56	nw.
Do	6	53	nw.	Tatoosh Island, Wash	24	66	s.

DESCRIPTION OF TABLES AND CHARTS.

By Mr. W. B. STOCKMAN, Forecast Official, in charge of Division of Meteorological Records.

For description of tables and charts see page 286 of REVIEW for June, 1903.

TABLE 1.—*Climatological data for Weather Bureau stations, September, 1903.*

Stations.	Elevation of instruments. Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
New England.							**61.2**	**+ 0.5**										**79**	**1.57**	**− 1.6**										**4.0**	
Eastport	76	69	82	29.98	30.05	+ .02	57.5	+ 1.7	85	14	65	38	30	50	26	53	51	85	1.62	− 1.6	8	6,264	s.	36	sw.	17	11	11	8	4.8	
Portland, Me.	103	81	117	29.97	30.09	+ .04	61.2	+ 1.5	91	14	70	36	30	52	32	56	52	77	2.06	− 1.0	6	6,008	s.	48	se.	17	15	10	5	3.8	
Concord	298	70	79	29.79	30.11	+ .05	60.8	+ 0.6	90	14	73	30	30	48	39	.....	.....	.....	1.24	− 2.0	6	3,190	n.	28	e.	16	15	13	2	3.8	
Northfield	876	16	60	29.17	30.12	+ .06	56.8	+ 0.8	87	15	71	30	8	43	40	52	49	80	1.21	− 1.6	5	5,130	s.	36	sw.	27	16	10	4	3.4	
Boston	125	115	181	29.98	30.11	+ .04	64.4	+ 2.0	91	14	73	42	30	56	26	58	54	72	2.43	− 0.5	5	6,932	sw.	42	s.	16	15	7	8	3.8	
Nantucket	12	43	85	30.12	30.13	+ .05	62.8	+ 0.1	78	11	68	49	29	58	16	59	55	80	1.37	− 1.9	4	8,640	sw.	38	ne.	21	10	13	7	4.8	
Block Island	26	11	60	30.12	30.15	+ .07	63.0	− 0.6	79	11	69	47	29	57	21	58	56	80	1.15	− 1.8	4	9,867	sw.	36	ne.	21	12	18	0	3.7	
Narragansett	.....	10	38	.....	.....	.....	61.6	− 0.6	85	11	70	36	*	53	30	.....	.....	.....	0.84	− 2.4	4	.....	s.	.....	.....	.....	17	4	9	.....	
New Haven	106	117	140	30.02	30.13	+ .06	62.9	− 0.6	88	14	72	41	29	54	28	58	55	79	2.20	− 1.5	8	5,668	sw.	60	s.	16	15	9	6	4.1	
Mid. Atlantic States.							**66.7**	**− 0.3**										**79**	**2.05**	**− 1.7**										**4.0**	
Albany	97	102	115	30.03	30.13	+ .06	64.0	+ 0.9	89	14	74	40	30	54	30	57	54	77	1.30	− 2.1	4	4,613	s.	32	se.	17	19	8	3	3.3	
Binghamton	875	79	90	29.21	30.14	+ .07	61.2	+ 0.2	87	14	72	33	30	50	39	.....	.....	.....	1.21	− 2.1	3	3,461	e.	24	sw.	17	18	5	7	4.3	
New York	314	108	350	29.80	30.13	+ .05	65.4	− 0.5	84	14	72	45	29	59	19	61	58	80	2.60	− 1.1	7	7,320	nw.	65	nw.	17	11	10	9	4.7	
Harrisburg	374	94	104	29.75	30.14	+ .06	65.2	+ 0.8	87	16	75	41	30	56	30	59	56	78	1.95	− 2.1	6	3,625	nw.	26	nw.	17	17	8	5	3.6	
Philadelphia	117	168	184	30.02	30.15	+ .07	67.6	+ 0.5	86	13	76	47	29	60	24	61	58	77	2.31	− 1.0	5	5,947	n.	36	n.	16	18	4	8	4.0	
Scranton	805	111	119	29.29	30.15	+ .08	62.0	.....	87	14	73	34	30	51	38	56	53	77	1.27	.....	4	4,330	ne.	36	sw.	17	15	9	6	4.5	
Atlantic City	52	39	48	30.08	30.14	+ .07	65.7	− 1.0	87	11	71	44	29	60	23	62	59	81	2.22	− 1.3	9	5,934	sw.	60	se.	16	13	13	4	4.4	
Cape May	17	47	51	30.14	30.16	+ .09	66.2	− 1.9	82	11	72	47	29	61	20	62	.....	.....	4.66	+ 1.1	9	5,545	n.	48	ne.	16	15	12	3	4.0	
Baltimore	123	69	117	30.01	30.14	+ .06	68.2	+ 0.3	89	13	78	43	29	59	30	61	57	73	1.00	− 2.9	5	4,549	nw.	34	w.	17	13	10	7	4.6	
Washington	112	59	76	30.03	30.15	+ .07	67.2	− 0.6	88	12	77	42	30	57	30	61	58	79	0.74	− 3.0	4	3,685	s.	32	nw.	17	16	9	5	3.7	
Cape Henry	18	11	58	30.11	30.13	+ .07	71.0	− 0.8	90	11	76	52	30	66	21	.....	.....	.....	0.76	− 3.8	6	10,895	ne.	54	nw.	15	16	2	12	4.3	
Lynchburg	681	83	88	29.40	30.15	+ .07	67.8	− 1.2	90	5	78	42	29	57	33	61	59	83	3.02	− 0.8	6	2,234	ne.	25	n.	5	17	11	2	3.1	
Norfolk	91	102	111	30.05	30.15	+ .09	70.4	− 0.7	88	12	77	50	30	64	24	65	62	78	2.79	− 1.8	8	6,111	ne.	28	nw.	15	14	7	9	4.7	
Richmond	144	82	90	30.00	30.15	+ .08	69.4	.....	88	11	79	47	25	60	29	.....	.....	.....	1.60	.....	7	3,419	n.	20	s.	17	12	12	6	4.3	
Wytheville	2,293	40	47	27.80	30.19	+ .12	62.3	.....	85	8	75	34	19	50	37	56	53	82	1.05	.....	5	2,460	e.	17	nw.	17	18	10	2	3.0	
S. Atlantic States.							**72.5**	**− 0.8**										**78**	**3.48**	**− 1.6**										**4.8**	
Asheville	2,255	53	75	27.83	30.14	+ .07	64.6	− 0.3	84	5	75	36	19	54	34	58	56	81	0.82	− 2.1	4	4,622	se.	28	nw.	17	13	9	8	4.7	
Charlotte	773	68	76	29.32	30.15	+ .08	70.4	− 0.7	90	5	80	49	19	61	24	62	59	73	3.29	− 0.1	4	4,153	ne.	23	ne.	9	14	11	5	3.8	
Hatteras	11	12	47	30.11	30.12	+ .06	72.8	− 0.9	86	1	77	58	30	68	14	68	67	83	6.30	− 0.1	9	10,352	ne.	60	nw.	15	14	8	8	4.7	
Raleigh	376	93	101	29.74	30.13	+ .06	70.5	0.0	87	15	80	47	30	61	27	63	60	76	1.43	− 1.8	5	4,031	ne.	28	nw.	17	19	7	4	3.4	
Wilmington	78	82	90	30.02	30.09	+ .04	72.2	− 1.4	90	6	80	53	30	64	25	66	63	78	1.16	− 5.3	6	5,444	ne.	26	s.	16	14	8	8	4.4	
Charleston	48	14	92	30.05	30.10	+ .06	75.2	− 0.8	87	5	81	61	20	70	19	69	66	78	2.36	− 4.2	10	9,045	e.	36	se.	12	7	18	5	5.2	
Columbia, S. C.	351	114	122	29.74	30.12	+ .07	72.8	− 2.2	94	6	82	53	30	64	26	65	62	75	2.68	− 1.4	3	5,724	ne.	30	se.	12	13	12	5	4.2	
Augusta	180	89	97	29.90	30.09	+ .04	73.8	− 0.6	94	6	83	54	18	65	28	66	63	75	4.48	+ 0.6	7	4,754	ne.	48	ne.	3	19	8	3	3.3	
Savannah	65	79	89	30.01	30.08	+ .05	75.4	− 0.4	93	6	83	59	23	68	25	69	66	81	8.45	+ 2.3	10	5,404	n.	27	sw.	16	11	11	8	4.8	
Jacksonville	43	101	129	29.99	30.03	+ .03	76.8	− 0.8	92	6	84	61	23	70	23	70	68	78	2.80	− 5.6	8	7,646	e.	46	sw.	16	11	13	6	4.9	
Florida Peninsula.							**80.1**	**− 0.4**										**79**	**9.82**	**+ 1.5**										**5.5**	
Jupiter	28	10	48	29.96	29.99	+ .03	79.6	0.0	93	1	85	69	25	74	19	75	73	81	15.82	+ 6.3	21	8,688	ne.	78	ne.	11	3	21	6	6.0	
Key West	22	10	53	29.95	29.97	+ .03	82.0	− 0.5	93	2	88	70	25	77	19	76	74	77	3.00	− 4.4	11	5,652	ne.	40	sw.	12	8	11	11	5.6	
Sand Key	24	.....	.....	.....	.....	.....	82.0	.....	94	18	86	72	11	78	15	.....	.....	.....	3.72	.....	15	9,216	e.	48	se.	30	7	13	10	5.8	
Tampa	34	60	67	29.96	30.00	+ .03	78.8	− 0.8	91	7	87	64	24	71	23	72	70	80	10.64	+ 2.7	10	5,161	ne.	48	ne.	12	11	14	5	4.6	
East Gulf States.							**74.4**	**− 1.0**										**71**	**1.38**	**− 2.4**										**2.9**	
Atlanta	1,174	190	216	28.87	30.09	+ .04	71.0	− 0.5	91	6	80	45	18	62	28	62	58	70	2.52	− 1.2	4	8,655	se.	44	e.	14	11	13	6	4.5	
Macon	370	93	99	29.69	30.08	+ .05	73.0	.....	93	6	82	51	18	64	28	.....	.....	.....	3.65	.....	4	3,822	e.	30	e.	13	19	6	5	3.4	
Pensacola	56	79	96	29.99	30.05	+ .06	76.4	− 1.1	93	15	84	55	18	69	26	.....	.....	.....	0.47	− 4.3	4	7,376	n.	36	n.	13	22	7	1	2.5	
Birmingham	700	136	143	29.34	30.09	+ .06	73.0	− 1.9	95	6	83	46	18	63	30	.....	.....	.....	0.97	− 1.9	5	5,994	ne.	32	se.	13	19	9	2	3.0	
Mobile	57	88	96	29.99	30.06	+ .06	76.7	− 0.1	94	15	86	54	19	68	24	66	63	70	0.83	− 4.3	5	5,281	n.	24	nw.	13	23	6	1	2.1	
Montgomery	223	100	112	29.82	30.04	+ .02	73.9	− 1.7	95	7	84	49	19	64	28	65	62	71	1.06	− 1.9	5	4,806	e.	30	ne.	14	19	7	4	3.3	
Meridian	375	84	93	29.68	30.07	+ .05	72.2	− 0.8	94	6	85	42	19	59	40	.....	.....	.....	0.09	− 2.7	2	3,406	ne.	24	nw.	16	24	5	1	1.9	
Vicksburg	247	62	74	29.79	30.03	+ .01	74.0	− 1.3	93	9	84	53	17	64	25	66	63	76	1.81	− 1.7	4	4,077	n.	32	ne.	15	22	4	4	2.6	
New Orleans	51	88	121	29.99	30.04	+ .06	77.8	− 0.5	92	15	86	58	18	70	20	68	64	70	3.32	− 1.3	5	5,532	ne.	30	se.	11	17	11	2	2.9	
West Gulf States.							**75.2**	**− 0.8**										**72**	**1.83**	**− 2.2**										**3.7**	
Shreveport	249	77	84	29.80	30.06	+ .06	74.8	− 0.7	96	14	86	49	17	64	31	65	61	71	0.35	− 3.4	5	4,082	se.	27	se.	7	21	4	5	3.3	
Fort Smith	457	79	94	29.57	30.04	+ .03	71.4	− 0.9	92	8	82	43	17	60	31	62	58	71	1.33	− 2.2	7	5,812	e.	32	w.	16	12	15	3	3.6	
Little Rock	357	93	100	29.71	30.08	+ .05	71.4	− 1.5	91	8	81	47	17	62	26	63	59	72	2.09	− 1.1	8	4,235	nw.	29	nw.	14	17	8	5	3.7	
Corpus Christi	20	48	53	29.99	30.01	+ .06	78.8	0.0	89	14	85	54	17	73	22	72	69	76	0.89	− 3.9	4	7,641	se.	29	e.	21	17	13	0	3.2	
Fort Worth	670	106	114	29.32	30.02	+ .03	74.8	.....	93	8	86	44	17	64	32	.....	.....	.....	2.70	.....	5	8,139	s.	31	s.	26	19	7	4	3.6	
Galveston	54	106	112	29.96	30.02	+ .04	79.1	− 0.4	88	15	84	60	17	75	20	71	68	72	2.76	− 3.4	5	7,479	se.	28	n.	17	21	8	1	2.3	
Palestine	510	73	79	29.52	30.04	+ .05	74.1	− 1.6	90	15	84	47	17	64	31	66	62	75	2.45	− 0.8	4	4,636	se.	34	s.	29	14	12	4	4.3	
San Antonio	701	80	91	29.28	30.00	+ .04	76.7	− 0.8	92	7	87	50	18	66	30	67	63	70	2.96	− 0.4	4	4,838	se.	26	se.	9	12	10	8	4.6	
Taylor	583	55	63	29.42	30.04	+ .07	74.9	.....	93	9	87	46	18	63	33	.....	.....	.....	0.77	.....	6	5,097	s.	22	s.	12	9	16	5	4.8	
Ohio Val. and Tenn.							**69.0**	**+ 0.8**										**69**	**0.89**	**− 2.0**										**3.2**	
Chattanooga	762	106	112	29.32	30.14	+ .08	71.6	+ 0.9	94	7	83	48	18	60	36	61	55	63	0.60	− 3.1	6	4,705	ne.	25	w.	27	15	11	4	3.4	
Knoxville	1,004	35	88	29.08	30.12	+ .06	70.0	+ 0.7	92	7	82	43	19	58	35	60	55	66	0.62	− 2.1	2	4,254	n.	40	s.	9	21	6	3	2.6	
Memphis	397	146	154	29.68	30.10	+ .07	72.7	+ 0.6	92	9	82	48	17	63	26	64	60	71	0.35	− 2.8	4	5,787	n.	26	sw.	7	23	4	3	2.2	
Nashville	546	122	134	29.54	30.12	+ .06	71.6	+ 0.9	96	7	84	43	18	59	42	60	54	62	0.13	− 3.9	1	4,439	s.	25	s.	12	20	6	4	3.0	
Lexington	989	75	102	29.08	30.14	+ .07	69.8	+ 0.9	92	7	81	40	18	58	32	.....	.....	.....	0.81	− 1.7	5	6,133	s.	30	w.	10	21	6	3	2.4	
Louisville	525	114	136	29.56	30.14	+ .08	70.7	+ 1.3	95	9	83	42	18	58	35	59	54	64	0.83	− 2.0	5	4,426	n.	32	w.	27	19	8	3	3.1	
Evansville	431	72	82	29.64	30.11	+ .05	70.3	.....	92	8	81	44	18	59	33	.....	.....	.....	0.49	.....	6	4,101	ne.	29	s.	11	18	11	1	3.2	
Indianapolis	822	154	164	29.24	30.12	+ .06	67.0	+ 1.0	90	7	77	40	18	57	29	58	53	67	1.18	− 1.8	5	6,259	s.	37	s.	10	19	7	4	3.2	
Cincinnati	628	152	160	29.46	30.14	+ .07	69.2	+ 1.1	93	8	81	44	19	57	34	59	54	65	1.78	− 0.6	7	3,450	se.	34	w.	10	16	12	2	3.4	
Columbus	824	173	190	29.26	30.13	+ .06	67.6	+ 1.5	92	8	80	41	24	56	34	57	51	63	1.46	− 1.2	6	6,624	s.	60	w.	10	15	10	5	4.1	
Pittsburg	842	116	123	29.24	30.14	+ .06	67.1	+ 0.7	90	12	78	42	29	57	34	58	54	70	1.04	− 1.5	5	3,391	n.	20	nw.	27	16	12	2	3.0	
Parkersburg	638	77	84	29.47	30.15	+ .07	67.8	− 0.4	92	10	81	37	19	55	38	60	57	75	1.03	− 1.8	5	3,102	se.	36	nw.	10	10	18	2	3.9	
Elkins	1,940	41	50	28.14	30.19	+ .13	61.4	.....	88	14	77	32	29	46	47	54	52	88	1.69	.....	7	1,855	n.	18	w.	17	11	14	5	4.7	
Lower Lake Region.							**64.4**	**+ 1.2**										**74**	**1.86**	**− 1.1**										**4.0**	
Buffalo	767	178	206	29.28	30.10	+ .04	64.0	+ 1.9	89	12	71	43	29	57	27	58	54	73	0.81	− 2.5	10	8,685	sw.	60	w.	27	8	16	6	5.1	
Oswego	335	76	91	29.73	30.09	+ .03	62.3	+ 0.6	87	14	71	42	30	54	31	56	52	74	2.21	− 0.6	8	6,786	s.	29	w.	17	15	13	2	3.4	
Rochester	523	81	102	29.54	30.11	+ .05	64.0	+ 2.0	91	15	74	38	29	54	34	56	52	73	1.11	− 1.2	7	5,275	sw.	29	sw.	27	14	9	7	4.1	
Syracuse	597	97	113	29.48	30.12	+ .05	62.3	.....	86	14	71	39	29	53	32	.....	.....	.....	0.99	.....	8	7,949	s.	37	nw.	17	13	15	2	4.4	
Erie	713	92	102	29.35	30.11	+ .05	64.9	+ 1.3	88	15	73	40	29	57	26	58	54	74	1.50	− 2.5	8	7,090	s.	35	nw.	27	16	8	6	4.6	
Cleveland	762	190	201	29.30	30.12	+ .06	64.8	+ 1.0	88	14	74	42	29	56	28	58	54	74	2.46	− 1.0	6	10,029	se.	48	w.	27	13	14	3	4.0	
Sandusky	629	62	70	29.44	30.12	+ .06	65.8	+ 0.7	91	15	75	42	18	56	31	.....	.....	.....	1.27	− 1.6	6	5,286	sw.	35	w.	27	19	9	2	2.4	
Toledo	628	120	127	29.44	30.12	+ .06	64.9	+ 1.0	90	15	75	40	24	54	33	57	52	71	2.71	+ 0.3	7	6,065	s.	36	sw.	10	18	8	4	3.7	
Detroit	730	153	193	29.31	30.10	+ .04	64.1	+ 1.2	88	15	73	41	18	55	33	58	56	80	2.78	+ 0.3	9	7,336	sw.	31	nw.	27	10	14	6	4.6	
Upper Lake Region.							**58.9**	**− 0.3**										**77**	**3.96**	**+ 0.5**										**5.6**	
Alpena	609	63	80	29.40	30.08	+ .05	57.2	0.0	84	3	66	34	29	48	30	53	50	80	3.02	− 0.8	13	7,262	nw.	39	nw.	23	9	8	13	6.0	
Escanaba	612	40	48	29.36	30.03	+ .02	55.4	− 1.3	77	3	64	32	28	47	27	52	49	82	4.73	+ 1.2	16	5,906	s.	27	nw.	23	10	12	8	4.9	
Grand Rapids	707	127	165	29.31	30.08	+ .04	62.4	− 0.5	87	12	72	40	29	53	32	56	53	79	5.22	+ 1.9	11	6,915	s.	37	sw.	26	12	14	4	4.7	
Houghton	668	66	74	29.25	29.98	− .02	55.6	.....	85	22	64	35	29	47	43	.....	.....	.....	3.03	.....	14	5,516	e.	27	w.	23	10	5	15	5.9	
Marquette	734	79	116	29.20	30.00	.00	56.6	− 0.2	82	22	64	38	29	49	32	49	45	69	2.93	− 1.0	12	9,211	sw.	38	sw.	22	5	10	15	6.6	
Port Huron	638	70	120	29.43	30.12	+ .06	62.0	+ 0.8	86	12	72	37	28	52	35	56	53	79	3.23	+ 0.6	12	7,512	s.	34	nw.	23	7	15	8	5.5	
Sault Ste. Marie	614	40	61	29.34	30.00	− .02	54.6	− 0.9	77	9	63	34	29	46	28	49	46	79	3.31	− 1.2	15	6,380	nw.	49	nw.	23	9	5	16	6.7	T.
Chicago	823	241	274	29.20	30.09	+ .05	64.4	+ 0.2	86	7	72	40	18	57	29	56	52	69	4.00	+ 1.2	11	11,898	s.	51	s.	12	13	9	8	4.7	
Milwaukee	681	124	142	29.33	30.07	+ .04	62.3	+ 1.1	84	12	71	39	28	54	27	57	54	80	5.02	+ 2.2	11	7,550	sw.	37	s.	12	15	7	8	4.3	
Green Bay	617	49	86	29.38	30.04	+ .02	59.4	− 1.1	84	12	69	33	28	50	30	53	50	77	3.39	0.0	11	7,772	sw.	36	s.	12	9	9	12	6.1	
Duluth	702	95	116	29.21	29.98	.00	54.8	− 1.4	84	22	62	35	27	47	31	48	43	72	4.76	+ 0.9	10	7,924	ne.	41	sw.	12	7	13	10	5.9	

TABLE I.—*Climatological data for Weather Bureau stations, September, 1903*—Continued.

Stations.	Elevation of instruments. Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
North Dakota.							**52.3**	**−4.0**										**75**	**3.12**	**+1.8**										**5.5**	
Moorhead	935	54	60	28.95	29.97	+.01	53.4	−3.1	82	19	64	29	16	43	39	47	44	76	5.60	+3.5	12	7,377	nw.	51	sw.	12	8	9	13	6.1	
Bismarck	1,674	16	29	28.19	29.98	+.04	52.8	−4.2	80	21	63	28	14	42	37	46	42	74	2.36	+1.2	7	6,947	n.	48	n.	12	14	5	11	5.3	1.0
Williston	1,875	14	44	27.96	29.94	+.01	50.8	−4.7	82	28	62	28	14	39	42	44	40	74	1.39	+0.6	11	6,685	ne.	45	nw.	22	13	6	11	5.2	2.1
Upper Miss. Valley.							**64.0**	**−1.0**										**76**	**4.45**	**+1.2**										**4.4**	
Minneapolis	....	99	208	....	....	....	58.2	−4.0	82	22	66	37	18	50	28	....	....	....	7.77	+5.2	11	9,489	s.	46	s.	12	10	10	10	....	
St. Paul	837	102	122	29.08	29.98	−.01	58.7	−1.1	84	1	68	37	17	50	30	52	49	77	7.84	+4.8	11	5,873	se.	28	nw.	23	13	7	10	5.0	
La Crosse	714	71	87	29.26	30.03	+.02	60.2	−1.4	82	22	69	37	28	51	27	....	....	....	3.28	−0.9	12	5,953	s.	30	s.	2	11	11	8	4.9	
Davenport	606	71	79	29.39	30.03	.00	63.8	−0.9	86	7	73	40	18	54	28	58	55	78	7.09	+3.9	11	4,981	s.	30	s.	12	14	6	10	4.6	
Des Moines	861	84	99	29.12	30.05	+.03	61.9	−2.2	84	25	72	39	18	52	33	56	53	78	1.62	−1.6	12	6,287	sw.	37	s.	12	11	6	13	5.7	
Dubuque	698	100	117	29.30	30.06	+.03	61.8	−1.4	84	7	72	35	18	52	28	56	53	77	3.20	−0.9	12	5,084	s.	28	se.	12	15	8	7	4.2	
Keokuk	614	63	78	29.39	30.04	+.01	65.6	−0.8	89	7	75	41	24	56	30	59	56	80	7.16	+3.6	10	5,045	s.	24	s.	12	15	5	10	4.0	
Cairo	356	87	93	29.72	30.10	+.05	71.1	+1.2	91	14	81	48	17	61	27	62	58	71	0.75	−1.8	6	4,776	s.	28	n.	23	15	11	4	3.5	
Springfield, Ill	644	82	93	29.40	30.08	+.03	66.4	0.0	89	7	77	42	18	56	31	58	54	74	2.48	−0.7	11	6,136	s.	29	s.	12	15	7	8	4.1	
Hannibal	534	75	110	29.49	30.06	+.03	66.4	−0.3	90	7	77	38	18	56	29	....	....	....	4.71	+1.6	10	6,444	sw.	48	w.	9	15	8	7	3.4	
St. Louis	567	208	217	29.48	30.08	+.04	69.6	+0.2	92	7	79	45	17	60	29	62	59	76	3.06	−0.1	6	6,929	s.	36	nw.	26	13	9	8	4.3	
Missouri Valley.							**62.6**	**−2.6**										**70**	**3.06**	**+0.6**										**4.9**	
Columbia, Mo	784	11	84	29.22	30.04	+.01	66.4	−3.1	92	7	78	37	17	55	33	....	....	....	5.24	+2.0	11	4,874	s.	30	nw.	26	13	8	9	4.8	
Kansas City	963	78	95	29.03	30.06	+.04	67.0	−0.5	90	7	77	44	16	57	31	58	54	71	6.12	+2.7	9	6,349	se.	28	s.	7	16	3	11	4.3	
Springfield, Mo	1,324	98	104	28.68	30.08	+.05	67.2	−0.5	88	7	77	39	17	57	30	59	55	73	4.68	+0.9	9	7,536	se.	36	w.	9	21	5	4	2.7	
Topeka	....	81	89	....	....	....	66.0	−2.7	90	7	77	41	17	55	33	....	....	....	2.74	−0.6	8	7,154	s.	34	s.	7	12	12	6	4.2	
Lincoln	1,189	75	84	28.72	29.98	−.01	63.0	−3.1	89	25	74	34	16	52	33	54	50	71	1.34	−0.7	11	8,698	s.	35	sw.	12	12	9	9	4.5	
Omaha	1,105	115	121	28.82	30.00	.00	63.0	−1.8	87	25	73	36	16	53	31	55	51	73	2.50	−0.4	11	6,661	s.	32	n.	13	12	6	12	5.2	
Valentine	2,598	47	54	27.23	29.93	−.03	58.0	−3.6	91	21	71	28	17	45	46	49	43	67	1.70	+0.7	8	7,568	nw.	37	n.	25	7	11	12	5.7	1.0
Sioux City	1,135	96	164	28.78	29.99	+.01	60.8	−4.4	86	25	71	33	16	50	37	....	....	....	3.06	+1.0	9	9,855	s.	42	nw.	26	13	6	11	5.1	
Pierre	1,572	43	50	28.32	29.98	+.03	58.5	−5.2	86	28	69	32	17	48	41	49	43	65	1.97	+1.0	12	5,233	n.	43	nw.	12	10	12	8	5.5	0.1
Huron	1,306	56	67	28.57	29.96	.00	57.8	−2.3	88	2	71	25	16	45	48	50	45	72	2.62	+1.2	11	8,452	se.	46	sw.	12	4	12	14	6.6	
Yankton	1,233	42	49	28.63	29.94	−.04	60.8	−1.3	95	25	73	32	16	49	42	....	....	....	1.74	−1.1	11	5,518	se.	31	se.	12	12	8	10	5.3	
Northern Slope.							**55.4**	**−2.8**										**64**	**1.50**	**+0.5**										**4.7**	
Havre	2,505	46	53	27.32	29.94	.00	54.3	−0.6	85	28	67	27	16	42	45	46	40	66	0.48	−0.7	8	6,972	sw.	48	sw.	24	9	12	9	5.4	
Miles City	2,371	42	50	27.46	29.96	+.01	56.8	−3.2	84	28	67	32	13	46	38	51	48	80	1.58	+0.8	6	4,268	ne.	30	w.	8	16	6	8	4.5	1.6
Helena	4,110	88	94	25.81	29.98	+.01	54.6	−1.2	82	23	66	30	14	44	36	43	34	52	0.90	−0.2	7	6,170	sw.	42	sw.	5	9	12	9	5.1	1.0
Kalispell	2,965	45	51	26.92	29.97	+.01	50.8	....	78	28	62	27	15	39	41	43	37	66	1.49	....	6	4,232	w.	32	sw.	21	10	11	9	5.3	T.
Rapid City	3,234	46	50	26.61	29.96	.00	55.0	−6.4	83	21	66	31	14	44	37	47	41	68	2.79	+2.2	8	5,104	w.	36	n.	25	14	6	10	4.5	2.8
Cheyenne	6,088	56	64	24.05	29.96	.00	53.8	−2.4	87	1	67	20	15	41	38	42	34	54	1.40	+0.5	8	7,341	nw.	38	w.	12	15	7	8	4.1	1.8
Lander	5,372	26	36	24.66	30.00	+.04	51.6	−4.2	90	1	67	26	9	36	45	42	35	64	2.58	+1.7	8	2,479	sw.	28	se.	5	14	9	7	4.3	17.4
North Platte	2,821	43	52	27.07	29.97	.00	61.6	−0.8	96	2	76	24	17	47	50	51	45	64	0.76	−0.5	6	6,643	nw.	32	w.	25	13	12	5	4.4	
Middle Slope.							**66.0**	**−1.7**										**60**	**1.15**	**+0.6**										**3.7**	
Denver	5,291	79	151	24.75	29.96	.00	60.6	−1.3	91	2	74	32	15	47	42	47	37	52	0.56	−0.2	5	5,604	s.	36	ne.	26	12	13	5	4.5	T.
Pueblo	4,685	80	86	25.29	29.93	−.03	63.4	−1.8	95	1	79	33	17	48	44	48	35	43	0.21	−0.2	5	5,111	nw.	36	nw.	12	19	10	1	3.4	
Concordia	1,398	42	47	28.53	29.99	.00	65.6	−2.2	90	3	77	36	16	54	38	56	52	73	1.84	−0.6	4	6,379	s.	30	s.	6	14	10	6	3.9	
Dodge	2,509	44	54	27.40	29.97	−.01	67.2	−0.4	95	4	81	32	17	53	48	55	49	61	0.15	−1.2	2	9,487	se.	44	s.	11	19	6	5	3.2	
Wichita	1,358	78	86	28.60	30.02	+.02	68.8	−1.2	93	4	81	39	27	57	32	58	54	68	2.25	−0.7	6	6,417	s.	25	n.	26	20	7	3	3.3	
Oklahoma	1,214	79	86	28.74	29.99	.00	70.6	−3.2	94	8	82	44	17	60	30	60	55	66	1.89	−0.7	7	9,570	s.	38	s.	7	15	11	4	3.8	
Southern Slope.							**70.0**	**−1.0**										**65**	**4.73**	**+2.2**										**4.2**	
Abilene	1,738	45	54	28.21	29.99	+.03	72.6	−2.0	93	8	82	43	17	63	30	63	58	69	8.64	+6.2	9	6,272	se.	33	nw.	14	13	5	12	5.1	
Amarillo	3,676	10	49	26.27	29.95	−.01	67.4	0.0	95	8	80	41	16	55	37	55	48	61	0.82	−1.8	7	10,730	s.	40	n.	26	21	8	1	3.4	
Southern Plateau.							**70.6**	**−0.7**										**42**	**2.10**	**+1.4**										**3.3**	
El Paso	3,762	10	110	26.18	29.87	−.01	73.8	+0.7	96	4	86	47	17	62	36	58	47	49	3.52	+2.4	5	7,154	e.	38	ne.	16	14	11	5	3.7	
Santa Fe	7,013	47	50	23.34	29.92	−.01	59.4	−0.5	82	4	70	37	16	49	31	45	34	46	0.55	−0.9	10	4,171	sw.	28	sw.	14	14	11	5	3.7	
Flagstaff	6,907	12	25	23.41	29.90	+.01	54.9	−3.5	80	4	68	26	15	42	45	47	....	....	4.68	+3.8	13	....	sw.	....	....	....	8	13	9	5.0	
Phoenix	1,108	50	56	28.70	29.82	+.01	81.7	+0.3	109	3	95	57	17	68	41	63	51	43	3.16	+2.5	6	3,434	e.	24	se.	1	21	5	4	3.1	
Yuma	141	16	46	29.65	29.80	+.02	83.4	−1.3	112	3	96	59	15	70	37	66	57	49	0.67	+0.5	1	4,331	sw.	25	s.	5	23	5	2	1.5	
Independence	3,910	51	58	25.95	29.87	+.01	70.1	+0.1	94	4	83	47	14	58	34	50	30	25	T.	−0.1	0	5,251	w.	41	sw.	5	19	8	3	2.6	
Middle Plateau.							**60.0**	**−2.8**										**43**	**0.53**	**−0.2**										**2.8**	
Carson City	4,720	82	92	25.29	29.92	−.03	59.1	−0.4	89	2	77	27	14	42	47	47	36	47	T.	−0.3	0	4,041	w.	33	sw.	5	24	4	2	1.4	
Winnemucca	4,344	59	70	25.62	29.97	+.04	56.7	−3.4	91	2	75	25	14	39	48	43	30	40	0.06	−0.3	1	5,253	ne.	44	sw.	5	22	7	1	1.8	T.
Modena	5,479	10	43	24.64	29.92	.00	59.2	....	89	4	74	30	12	44	45	44	29	41	1.48	....	7	7,268	w.	60	sw.	5	21	5	4	3.0	
Salt Lake City	4,366	105	110	25.62	29.95	.00	61.6	−2.7	92	3	73	37	16	50	35	46	32	38	0.84	−0.1	7	4,568	se.	40	nw.	11	14	9	7	4.0	
Grand Junction	4,608	43	51	25.39	29.95	.00	62.6	−4.6	93	1	76	32	15	49	40	49	39	51	0.69	−0.2	12	3,540	nw.	28	sw.	6	18	7	5	3.7	
Northern Plateau.							**58.3**	**−1.9**										**55**	**0.89**	**+0.1**										**4.5**	
Baker City	3,471	53	59	26.47	30.04	+.05	54.3	−1.5	88	4	67	28	30	41	40	44	35	55	1.06	+0.3	8	3,576	nw.	21	ne.	25	13	6	11	4.9	
Boise	2,739	61	68	27.17	30.01	+.04	59.7	−1.1	95	4	74	36	26	46	42	47	36	48	0.54	+0.1	2	2,542	nw.	21	w.	12	15	11	4	3.4	
Lewiston	757	52	61	29.18	29.98	.00	61.8	−0.5	92	4	74	35	30	49	40	....	....	....	1.02	+0.1	8	2,748	e.	31	nw.	28	15	7	8	3.9	
Pocatello	4,482	46	54	25.48	29.97	+.01	56.9	−3.6	90	1	70	28	15	44	39	44	31	42	0.42	−0.2	5	6,041	e.	34	s.	5	16	9	5	3.4	T.
Spokane	1,929	101	110	27.96	30.01	+.03	55.4	−2.7	82	4	67	29	30	44	40	46	38	59	0.83	−0.2	8	4,732	ne.	33	sw.	24	9	5	16	6.3	
Walla Walla	1,000	65	71	28.94	30.01	+.01	61.9	−2.0	84	1	73	38	30	50	36	56	52	73	1.47	+0.6	7	3,978	s.	22	sw.	28	16	11	3	3.7	
N. Pac. Coast Reg.							**57.0**	**−0.1**										**78**	**3.04**	**+0.1**										**5.6**	
North Head	211	11	56	29.85	30.07	+.04	56.2	−0.8	73	3	60	49	26	52	20	54	53	91	3.07	−0.6	16	10,210	nw.	72	nw.	11	11	6	13	5.7	
Port Crescent	259	12	29	29.79	30.06	+.04	52.4	−0.4	70	3	59	37	30	46	30	....	....	....	3.06	−0.4	14	3,311	w.	18	sw.	24	8	12	10	5.6	
Seattle	123	114	151	29.94	30.07	+.06	57.7	−0.7	74	4	64	42	30	51	25	53	49	75	3.18	+1.4	14	4,660	se.	32	s.	24	8	11	11	5.7	
Tacoma	213	113	120	29.82	30.05	+.03	56.8	+0.6	80	4	65	37	30	49	29	....	....	....	3.59	+1.4	13	4,178	n.	30	sw.	9	5	8	17	7.1	
Tatoosh Island	86	7	57	29.94	30.03	+.02	53.4	−0.4	68	3	57	46	20	50	19	51	50	91	6.68	+0.1	12	10,134	s.	66	s.	24	9	6	15	6.2	
Portland, Oreg	154	68	96	29.89	30.04	+.01	61.4	+0.7	86	3	72	41	30	51	33	54	48	69	1.13	−0.6	11	3,392	nw.	20	sw.	28	10	8	12	5.2	
Roseburg	518	56	67	29.49	30.05	+.03	61.0	+0.1	92	3	75	36	30	47	40	52	46	66	0.54	−0.5	7	2,478	n.	18	w.	12	16	9	5	3.1	
Mid. Pac. Coast Reg.							**63.4**	**+0.5**										**63**	**0.06**	**−0.7**										**3.1**	
Eureka	62	62	80	29.99	30.06	+.05	55.2	+0.8	71	16	60	44	14	51	21	52	50	85	0.28	−1.1	6	4,618	n.	46	n.	11	11	8	11	4.9	
Mount Tamalpais	2,375	11	18	27.52	29.96	+.02	67.8	....	93	2	75	40	30	61	27	51	34	37	T.	....	0	10,156	nw.	75	nw.	12	27	1	2	1.2	
Red Bluff	332	50	56	29.55	29.90	−.03	74.2	+0.4	104	2	88	51	30	61	39	56	38	33	0.00	−0.7	0	4,420	n.	36	n.	11	27	2	1	1.0	
Sacramento	69	106	117	29.81	29.88	−.01	70.4	+0.9	102	2	85	49	30	56	38	57	47	51	0.00	−0.4	0	5,602	se.	40	nw.	11	23	6	1	1.3	
San Francisco	155	161	167	29.80	29.97	+.03	61.0	+0.6	92	9	68	50	20	54	30	55	52	80	T.	−0.3	0	7,338	w.	34	w.	2	17	7	6	3.6	
Point Reyes Light	490	7	50	29.39	29.91	....	56.4	−0.2	85	9	62	48	20	51	33	....	....	....	T.	−1.0	0	14,533	nw.	75	nw.	12	11	6	13	5.3	
Southeast Farallon	30	9	17	29.93	29.96	....	55.4	....	69	9	58	49	2	53	14	54	53	94	T.	....	0	10,189	nw.	58	nw.	12	15	5	10	4.7	
S. Pac. Coast Reg.							**68.7**	**+0.4**										**66**	**0.11**	**0.0**										**3.0**	
Fresno	330	67	70	29.53	29.88	+.01	73.6	−0.9	106	3	90	47	14	58	40	56	40	37	0.00	−0.2	0	2,452	nw.	10	nw.	5	26	4	0	1.3	
Los Angeles	338	116	123	29.56	29.92	+.02	69.2	+0.7	95	16	79	52	22	59	39	60	56	75	0.43	+0.4	3	3,514	w.	18	sw.	13	9	15	6	4.4	
San Diego	87	94	102	29.82	29.92	+.03	67.9	+0.9	83	8	73	56	15	63	23	63	61	82	T.	−0.1	0	4,190	nw.	21	sw.	11	20	5	5	3.5	
San Luis Obispo	201	46	48	29.74	29.96	+.03	64.2	+0.8	91	8	77	43	14	52	40	56	51	72	T.	−0.1	0	2,676	w.	20	w.	5	23	3	4	2.6	
West Indies.																															
Basseterre	29	41	54	29.93	29.96	+.02	81.2	....	88	12	86	72	19	76	15	75	73	75	4.28	....	18	5,416	e.	22	e.	14	7	19	4	5.2	
Bridgetown	30	57	65	29.91	29.94	+.03	80.5	+1.8	89	26	86	73	14	75	15	76	73	78	5.02	−1.9	12	4,443	e.	26	s.	1	10	9	11	5.2	
Cienfuegos	52	62	67	29.90	29.95	+.04	79.9	....	93	3	89	67	28	71	24	74	72	84	6.98	....	15	4,164	ne.	25	n.	17	5	16	9	6.1	
Havana	57	87	105	29.90	29.96	+.05	79.8	−0.9	91	12	87	68	25	73	17	....	....	....	3.04	−3.7	16	5,679	e.	48	e.	30	7	20	3	4.9	
Kingston	286	41	85	29.62	29.91	+.03	80.8	....	90	17	87	64	12	74	23	....	....	....	1.20	....	7	....	nw.	....	....		3	26	1	....	
Puerto Principe	352	55	62	29.62	29.98	+.07	80.0	....	93	2	90	65	24	70	25	74	73	87	5.83	....	19	3,915	ne.	24	e.	18	8	15	7	5.4	
San Juan	82	48	90	29.88	29.96	+.02	80.4	−0.6	90	18	86	72	28	74	15	76	73	79	5.13	0.0	19	5,914	se.	30	se.	2	6	12	12	5.7	
Santiago de Cuba	82	46	52	29.86	29.94	+.04	80.3	....	91	2	89	69	11	72	21	74	72	83	3.34	....	15	4,043	n.	26	se.	24	2	25	3	5.6	
Santo Domingo	57	37	44	29.90	29.96	+.05	79.4	....	90	13	86	70	16	72	20	75	74	85	4.76	....	14	3,700	n.	19	s.	4	7	12	11	5.8	

* More than one date.

TABLE II.—*Climatological record of voluntary and other cooperating observers, September, 1903.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Anniston	98	36	72.2	0.91	
Ashville	95	41	69.9	0.70	
Benton				1.36	
Bridgeport				0.83	
Burkeville				0.85	
Calera				1.54	
Camphill	97	55	76.4	3.60	
Citronelle	96	51	77.2	1.24	
Clanton	100	45	73.8	2.00	
Cordova	99	35	71.8	0.81	
Daphne	99[e]	52[e]	77.2[e]	1.52	
Decatur	97	46	72.2	0.58	
Demopolis				1.58	
Dothan	98	53	75.6	5.60	
Eufaula	93	52	72.5	4.96	
Evergreen	95	49	74.0	1.59	
Flomaton	96	45	74.7	0.86	
Florence *a*				0.64	
Florence *b*	99	38	72.4	0.89	
Fort Deposit	95	49	73.3	2.10	
Gadsden	100	43	73.4	0.32	
Goodwater	96	45	72.0	1.93	
Greensboro	96	48	73.9	1.17	
Greenville				3.30	
Haleysville	96	42	74.4	T.	
Helena				1.80	
Highland Home	97	50	73.0	1.64	
Letohatchie				2.14	
Livingston	95	40	72.5	1.24	
Lock No. 4	101	43	72.8	1.13	
Madison Station	102	41	75.2	0.32	
Maplegrove	100	42	71.2	1.05	
Marion	96	47	73.8	0.40	
Milstead				1.65	
Newbern	100	45	75.0	2.22	
Notasulga				3.74	
Oneonto	97	36	71.0	0.68	
Opelika	92	47	72.4	2.97	
Ozark	97	51	74.9	4.00	
Prattville	95	44	72.2	0.99	
Pushmataha	94	41	73.0	0.37	
Riverton	98	37	70.8	0.76	
Selma	98	49	74.4	1.06	
Talladega	102	43	73.9	1.44	
Tallassee				1.21	
Thomasville	99	49	74.1	2.01	
Tuscaloosa	99	44	74.5	0.43	
Tuscumbia	98	44	71.8	1.25	
Tuskegee	99	49	75.3	2.52	
Union Springs	96	49	73.4	3.96	
Uniontown	97	44	72.8	1.87	
Valleyhead	96	38	70.9	1.02	
Verbena				2.17	
Wetumpka	98	47	74.4	1.55	
Alaska.					
Fort Liscum	66	24	44.2	8.62	
Killisnoo	63	35	49.4	3.10	
Orca	67	38	50.6	16.67	
Sitka	67	30	51.2	5.80	
Skagway	65	32	49.8	1.41	
Arizona.					
Agua Caliente	113	57	84.8	0.58	
Allaire Ranch				1.06	
Arizona Canal Co's Dam	110	55	81.6	1.09	
Aztec	114	49	85.1	0.35	
Benson	103	49	74.6	1.40	
Bisbee	91	53	70.4	0.30	
Bowie	101	50	74.8	1.14	
Buckeye	110	48	78.0	3.40	
Casagrande	113	55[e]	82.8[h]		
Champie Camp	113	41	73.6	2.70	
Cochise*[1]	91	54	69.9	1.22	
Congress	101	55	77.3	1.89	
Dragoon*[1]	91	58	71.6	0.99	
Dudleyville	104	45	75.7	2.06	
Duncan	100	37	70.2	2.62	
Fort Apache	94	33	63.7	1.85	
Fort Defiance	80	25	53.7	2.51	
Fort Grant	95	55	73.4	1.60	
Fort Huachuca	94	55	76.4	1.83	
Fort Mohave	114	53	82.7	0.24	
Greaterville	91	45	67.8	2.43	
Holbrook	97	32	65.4	1.27	
Jerome	92	48	68.9	4.60	
Kingman	101	50	73.6	1.52	
Maricopa	110	53	81.2	2.76	
Mellen	113	56	83.4	1.00	
Mesa	112	52	81.2	1.96	
Mesa (near)	113	52	80.6	2.23	
Mohawk Summit*[1]	116	69	88.6	0.92	
Natural Bridge				3.86	
Oracle	95	53	72.7	2.81	
Oro				3.17	
Parker	119	50	84.4	0.17	
Phoenix	111	50	80.3	2.68	
Pinal Ranch				3.39	
Prescott	92	26	61.3	2.36	
San Carlos	108	47	76.8	2.44	
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
San Simon	99	45	73.4	1.02	
Sentinel*[1]	114	64	89.5	1.00	
Signal	114	45	80.2	0.96	
Superstition				1.94	
Taylor	92	30	62.8	2.02	
Thatcher	104	43	75.4	0.74	
Tombstone	95	51	72.4	1.30	
Tonto	101[c]	52[b]	77.6[b]	1.91	
Tucson	104	50	78.4	1.17	
Upper San Pedro	92	44	70.8	1.13	
Vail*[5]	100	60	78.6	0.16	
Walnutgrove				2.80	
Wilcox	92	45	72.0	0.65	
Williams	86	28	60.2	1.83	
Yarnell				3.36	
Young	100	34	67.3	1.44	
Arkansas.					
Alco	94	39	70.2	3.55	
Amity	92	42	69.9	2.43	
Arkadelphia	94	44	71.0	4.04	
Arkansas City				0.40	
Batesville	92	43	70.0	2.47	
Beebranch[k]	94	44	71.1	0.80	
Blanchard	94	44	71.4	1.15	
Brinkley	96	44	70.2	3.04	
Camden *a*				0.93	
Camden *b*	95	48	72.6	0.47	
Conway	94	43	71.6	5.23	
Corning	97	39	68.8	2.92	
Dallas	91	42	71.3	7.38	
Dardanelle				2.58	
De Queen	100	42	75.6	2.95	
Des Arc	95	44	70.6	2.05	
Dodd City	93	35	68.4	3.25	
Dutton	86	37	65.6	2.45	
Elon	95[d]	44[d]	72.8[d]	1.68	
Eureka Springs	91	38	68.2	4.58	
Fayetteville	91	35	68.5	3.89	
Forrest City	94[e]	41[e]	69.8[e]	0.40	
Fulton				1.46	
Hardy	99	40	70.2	3.52	
Helena *a*				0.50	
Helena *b*	94	46	71.9	0.45	
Ione	91	40	71.2	3.90	
Jonesboro	99	39	71.1	1.65	
Lacrosse	95	40	69.1	3.27	
Lake Village	94	45	72.0	1.91	
Lonoke	97	41	70.8	0.99	
Lutherville	93	39	70.2	4.39	
Malvern	97	41	70.8	2.35	
Marvell	97	43	71.8	0.67	
Mossville	87	45	69.4	3.35	
Mount Nebo	84	45	69.4	2.89	
New Gascony	97	43	70.8	2.05	
Newport *a*				1.99	
Newport *b*	97	42	71.5	1.23	
Oregon	91	35	64.8	3.65	
Ozark	94	43	73.0	2.67	
Paragould	95	43	70.0	2.50	
Perry	91	43	70.2	2.66	
Pinebluff	97	45	71.2	2.26	
Pocahontas	97	38	69.8	2.52	
Pond	90	34	67.1	4.71	
Prescott	102	45	75.4	1.81	
Princeton	96	43	70.8	1.73	
Rison	98	42	69.4	3.33	
Rosadale	97	44	73.6	4.25	
Russellville	93	42	69.0	2.92	
Silversprings	89	36	67.2	2.85	
Spielerville	98	42	73.2	3.54	
Stuttgart	96	44	71.4	2.41	
Texarkana	98	44	74.6	0.59	
Warren	98	44	72.4	2.85	
Washington	96	45	74.2	1.59	
Wiggs	84	40	66.6	2.66	
Winchester	97	43	72.0	0.75	
Winslow	84	37	67.0	2.88	
Witts Springs	95	40	69.7	2.87	
California.					
Angiola	109	44	75.1	0.00	
Azusa	102	50	71.9	0.37	
Bagdad	109	58	83.6	T.	
Bakersfield	108	31	71.5	0.00	
Barstow	107	39	72.6	0.50	
Bear Valley				0.00	
Berkeley	92	46	61.2	0.00	
Bishop	95	35	65.6	T.	
Boca*[1]	88	30	50.8	0.00	
Bodie	84	7	45.8	0.30	2.0
Branscomb	96	40	64.0	0.02	
Caliente*[1]	104	64	78.9	0.00	
Campbell	97	38	63.3	0.00	
Campo				0.47	
Cedarville	95	27	57.3	0.37	
Chico	106	44	74.8	T.	
Cisco*[1]	80	40	57.7	0.00	
Claremont	101	46	71.4	0.45	
Cloverdale	104	42	68.6	0.00	
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Coachella	118	53	86.8	0.25	
Colusa	100	48	70.2	0.00	
Corning*[1]	96	58	73.2	0.00	
Coronado	86	56	68.8	T.	
Crescent City	78	39	57.0	0.98	
Cuyamaca	84	34	57.6	1.28	
Delano*[1]	105	59	77.6	0.00	
Delta*[5]	100	54	67.3	T.	
Drytown	102	45	68.4	0.00	
Dunnigan*[5]	102	53	76.3	0.00	
Durham	108	43	72.1	0.00	
Elcajon	100	47	70.1	T.	
Elmdale	106	42	69.8	0.00	
Elsinore	113	42	72.7	0.40	
Escondido	94	37	67.2	0.32	
Fallbrook	97	46	69.2	0.15	
Fordyce Dam				0.00	
Fort Ross	81	43	57.5	0.00	
Georgetown	98	46	68.4	T.	
Gilroy (near)	100	36	65.0	0.00	
Greenville	102	32	68.4	0.50	
Hanford	106	44	71.2	0.00	
Healdsburg	106	39	68.7	0.00	
Hollister	99	36	64.7	0.06	
Idylwild	91	28	60.9	2.21	
Imperial	110	59	85.4	0.25	
Iowa Hill*[1]	92	45	67.2	T.	
Irvine	96	58	72.1	0.12	
Jackson	98	49	71.8	0.00	
Jamestown	101	44	70.6	0.00	
Jolon				T.	
Kennedy Gold Mine	94	42	64.8	0.00	
Kentfield[d]	94	38	63.0	0.00	
Laguna Valley				1.08	
Lakeport (near)	92	51	70.3	0.00	
Laporte	82	31	57.4	0.40	
Legrande	108	40	70.8	T.	
Lemoncove	108	48	76.8	T.	
Lick Observatory	87	37	63.6	T.	
Livermore	106	42	68.9	0.00	
Lodi	100	41	68.2	0.00	
Los Gatos	99	45	67.0	0.00	
Mammoth	116	57	83.6	0.25	
Marysville	103	43	70.6	0.00	
Merced	108	38	72.8	0.00	
Mercury	100	42	68.2	0.00	
Mills College				0.00	
Milo				0.00	
Milton (near)	99	50	72.6	0.00	
Modesto*[1]	110	55	76.4	0.00	
Mohave	103	50	74.2	T.	
Mokelumne Hill				T.	
Montague	105	35	62.5	0.00	
Monterio	92	46	67.8	0.00	
Monterey*[1]	86	48	61.1	0.00	
Mount St. Helena				0.00	
Napa	106	45	66.4	0.00	
Needles	107	65	86.9	0.44	
Nevada City	96	34	63.4	0.14	
Newman	112	48	73.9	0.00	
Niles	98	42	65.4	0.00	
North Bloomfield	98[h]	37[h]	66.5[h]	0.06	
North San Juan	103	45	71.7	0.20	
Oakland	89	50	62.9	0.00	
Ontario	99	47	71.7	0.28	
Orland	107	60	74.2	0.00	
Orleans	106	42	71.4	0.00	
Oroville (near)	105	46	73.2	0.00	
Palermo	106	40	69.4	T.	
Peachland*[5]	93	44	64.6	0.01	
Pilot Creek				0.00	
Pine Crest	90	52	67.1	0.00	
Placerville	94	39	63.0	0.00	
Point Lobos	88	50	57.4	0.00	
Porterville	106	48	73.6	0.00	
Poway				0.17	
Quincy	87	28	56.0	0.35	
Ranch House	90	52	72.3	0.07	
Redding	101	50	74.6	0.00	
Redlands	108	51	73.5	0.54	
Reedley	107	43	73.0	0.09	
Represa	92	50	70.4	0.00	
Riovista	99	50	70.7	0.00	
Riverside	102	47	69.4	0.43	
Rohnerville				0.12	
Rosewood	103	44	70.6	T.	
Sacramento	95	45	66.4	0.00	
Salinas	93	40	62.8	0.00	
Salton	120	60	84.4	0.15	
San Bernardino	107	44	71.3	0.46	
San Jacinto	106	48	71.0	1.16	
San Jose	99	33	66.5	0.00	
San Leandro	96	44	62.9	0.00	
San Mateo*[1]	93	52	67.6	0.00	
San Miguel*[1]	103	44	68.2	0.00	
San Rafael	98	40	65.4	T.	
Santa Barbara	89	51	66.1	T.	
Santa Clara				0.00	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Santa Clara College	99	38	64.7	0.00	
Santa Cruz	93	38	60.4	0.00	
Santa Maria	86	45	65.8	0.00	
Santa Monica	92	52	66.1	0.37	
Santa Paula	97	50	71.0	T.	
Santa Rosa	101	38	64.8	T.	
Shasta	106	48	76.2	0.17	
Sierra Madre	94	52	70.2	0.46	
Sisson	94	32	58.3	T.	
Sonoma				0.00	
Stockton	97	48	68.4	0.00	
Storey	107	40	71.2	0.00	
Summerdale	88	36	62.3	0.00	
Susanville	89	28	58.2	0.15	
Tehama*[1]	100	56	76.7	0.00	
Tejon Ranch	101	53	75.4	T.	
Truckee*[1]	82	32	49.3	0.00	
Tulare [c]	106	44	71.5	0.00	
Tustin	87	64	75.4	0.18	
Ukiah	108	35	67.6	T.	
Upland	96	48	69.0	0.42	
Upperlake	103	38	66.8	0.00	
Upper Mattole*[1]	92	37	58.6	0.02	
Vacaville*[1]	105	51	72.1	0.00	
Visalia	107	41	71.3	0.06	
Volcano Springs	119	52	87.4	0.20	
Wasco	108	43	73.4	0.00	
Wheatland	99	46	69.4	0.02	
Williams*[1]	102	54	75.8	0.00	
Willits	102	38	63.4	T.	
Willow	100	50	72.2	0.00	
Zenia	93	35	61.2	0.17	
Colorado.					
Alford	88	19	53.6	1.64	3.5
Antelope Springs	77	15	46.6	2.06	T.
Ashcroft	79	11	46.2	2.47	
Blaine	96	31	67.8	0.09	
Boulder	93	30	61.0	1.31	1.0
Boxelder				2.21	
Breckenridge	71	19	44.6	1.53	9.7
Buenavista				0.10	
Canyon	92	30	62.2	0.41	
Castlerock	95	26	57.8	0.98	
Cedaredge	90	28	59.5	1.53	
Cheesman	89	27	56.8	0.57	T.
Cheyenne Wells	93	27	63.8	T.	
Clearview	74	22	49.2	0.74	
Collbran	90	27	56.8	2.24	
Colorado Springs	86	26	58.1		
Durango	89	28	57.6	2.15	
Fort Collins	92	26	56.8	0.87	
Fort Morgan	93	27[e]	59.4	0.65	
Fox	98	25	61.1	0.17	T.
Fruita	94	29	60.0	1.61	
Garnett	81	17	51.3	0.58	
Gilman				2.56	1.5
Gleneyre	92	26	57.8	0.40	
Greeley	96	24	59.1	0.72	T.
Grover				0.95	
Gunnison	82	19	50.2	1.42	
Hamps	91	27	57.2	0.44	
Hoehne	94	24	59.8	0.08	
Holly	96	28	65.2	0.02	
Holyoke (near)	96	25	60.5	0.42	
Husted	90	23	55.6	0.81	T.
Lake Moraine	69	12	45.6	1.52	T.
Lamar	103	28	66.7	0.07	
Laporte				0.97	T.
Las Animas	95	28	62.6	0.70	
Lay	90	24	51.3	3.26	
Leadville (near)	71	17	46.0	1.37	1.0
Leroy	93	29	59.8	0.62	T.
Longs Peak	75	12	47.1	3.23	13.0
Mancos	84	19	54.4	1.33	
Marshall Pass				1.10	9.5
Meeker	83	23	52.2	4.42	4.0
Montrose				1.94	
Parachute	92	28	59.0	2.51	
Platte Canon				0.79	
Rangely	90[p]	20	58.7[h]	2.48	T.
Rockyford	96	29	63.9	T.	
Ruby				0.64	6.0
Rogers Mesa	97	27	60.0	1.67	
Saguache	82	24	54.2	0.70	
Salida	85	21	55.0	0.38	
San Luis		19	51.8[f]	0.77	
Santa Clara	83	25	56.0	0.56	
Sapinero				1.02	T.
Silt	91	27	58.0	2.32	
Sugar Loaf	88	22	53.4	1.79	T.
Trinidad	86	35	61.6	0.13	
Twinlakes				0.30	T.
Vilas				0.27	
Wallet				0.30	
Waterdale	95	28	57.6	1.30	3.0
Westcliffe	82	19[m]	50.2[f]	0.58	3.0
Whitepine	77	14	44.2	2.02	1.0
Wray	98	26	63.1	0.69	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Yuma				0.35	
Connecticut.					
Bridgeport	89	37	64.0	2.60	
Canton	87	28	59.5	4.46	
Colchester	87	34	61.8	2.97	
Falls Village				2.02	
Hartford	86	38	61.9	3.68	
Hawleyville	86	33	62.1	6.17	
Lake Konomoc				1.50	
New London	88	41	64.6	1.31	
North Grosvenor Dale	89	29	61.6	1.70	
Norwalk	87	34	62.0	2.61	
Southington	87	31	61.8	3.00	
South Manchester				1.97	
Storrs	86	35	60.8	1.81	
Voluntown	90	28	62.2	1.13	
Wallingford				1.75	
Waterbury	92	31	63.4	3.02	
West Cornwall	89	36	61.2	2.85	
West Simsbury				4.57	
Delaware.					
Delaware City				2.28	
Milford	90	38	68.6	3.70	
Millsboro	90	37	67.0	3.94	
Newark	85	36	65.5	2.37	
Seaford	89	37	67.5	4.15	
District of Columbia.					
Distributing Reservoir*[5]	84	46	68.6	0.93	
Receiving Reservoir*[5]	86	45	67.8	0.89	
West Washington	88	42	67.0	0.90	
Florida.					
Archer	91	55	76.2	6.55	
Avon Park	94	61	79.4	8.84	
Bartow	95	64	79.8	10.57	
Bonifay	97	51	76.4	6.50	
Carrabelle				11.27	
Clermont	91	61	77.8	6.39	
De Funiak Springs	99	52	75.5	2.58	
Deland	91	59	77.3		
Eustis	95	63	78.8	6.96	
Federal Point	92	55	77.0	13.96	
Fernandina	97	62	78.2	4.13	
Fort George*[1]	88	68	78.9		
Fort Meade	96	64	79.8	19.04	
Fort Pierce	95	62	78.0	12.93	
Gainesville	93	57	77.8	4.12	
Grasmere	92	62	78.0		
Huntington	94	58	78.8	6.15	
Hypoluxo [a]	90	64	79.6		
Inverness	95[i]	53	78.4[d]	4.43	
Jasper	95[d]	50[d]	76.3[d]	7.75	
Johnstown [d]	91	58	76.8	5.63	
Kissimmee	95	63	77.6	12.06	
Lake City	93	57	76.4	5.27	
Macclenny	97	54	77.7	4.31	
Madison	96	56	76.3	13.79	
Malabar	95	62	79.4	8.14	
Manatee	95	56	79.5	3.67	
Marco	92	60	81.2	9.05	
Marianna	94	51	73.6	5.44	
Merritt Island	92	68	79.6	7.82	
Miami	93	62	80.8	12.54	
Middleburg [e]	94	49	75.2	4.09	
Molino	103	44	76.0	0.00	
Myers	90	64	79.0	4.15	
New Smyrna	93	66	77.4	5.17	
Nocatee	92	62	80.2		
Ocala	95	55	77.8	4.23	
Orange City		57		3.24	
Orange Home	94	59	78.6	4.68	
Orlando				8.08	
Pinemount	94	54	76.8	7.81	
Plant City	92	59	79.0	9.20	
Quincy	93	50	77.0	6.30	
Rockwell [f]	95	56	80.0	5.90	
St. Andrews	93	57	76.7	5.05	
St. Augustine	93	62	78.1	8.75	
St. Leo	93	58	77.4	7.39	
Stephensville	97	48	77.6	10.50	
Sumner	93	52	76.8	4.68	
Switzerland	91	56	76.6	4.10	
Tallahassee	94	58	77.0	9.96	
Tarpon Springs	96	56	78.8	10.40	
Wausau	100	43	77.2	6.40	
Wewahitchka	96	54	77.2	6.60	
Georgia.					
Abbeville				3.98	
Adairsville	92	46	71.0	0.78	
Albany	98	52	75.6	7.34	
Allapaha	95	54	74.8	7.99	
Alpharetta	92	48	71.0	3.33	
Americus	94	50	73.0	5.52	
Athens	90	47	70.8	4.98	
Bainbridge	92	49	73.4	7.43	
Blakely	95	52	73.6	7.50	
Bowersville	97	48	71.6	2.25	
Butler				6.74	
Camak	98	49	73.3	4.19	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Georgia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Canton				2.43	
Carlton				2.98	
Clayton	86	40	66.2	2.84	
Columbus	99	52	75.2	4.61	
Coney	98	49	73.8	5.63	
Covington	95	49	72.9	4.95	
Dahlonega	90	46	69.0	2.64	
Dawson	99[b]	50[j]	74.6[f]	5.14	
Diamond	94	41	70.0	1.53	
Douglas	99	54	75.8	5.46	
Dublin				3.91	
Dudley	97	51	74.4	2.66	
Eastman	97	51	75.3	4.51	
Elberton	95	48	72.3	2.99	
Experiment	93	46	70.9	4.67	
Fitzgerald	99	50	75.1	4.20	
Fleming	95	53	75.4	6.07	
Forsyth	98	47	73.0	5.07	
Fort Gaines	95	53	74.4	3.27	
Gainesville	93	47	69.8	4.98	
Gillsville	94	45	71.2	4.19	
Greensboro	95	47	71.9	3.39	
Greenbush	92	47	71.8	1.87	
Griffin	97	46	73.4	5.72	
Harrison	93	51	72.8	4.21	
Hawkinsville	95	50	72.4	4.60	
Hephzibah				3.40	
Jesup	99	55	76.4	5.98	
Lost Mountain	94	45	72.2	2.08	
Louisville	94	49	73.1	2.19	
Lumpkin	102	48	75.2	4.03	
Marshallville	92	52	74.2	5.86	
Mauzy	97	52	75.1	9.91	
Milledgeville	93	50	72.7	4.48	
Millen	97[m]	51[g]	74.2[j]	3.34	
Monticello	98	48	73.5	4.48	
Morgan	94			5.10	
Naylor	96	53	76.8	9.70	
Newnan	97	46	71.7	3.32	
Oakdale				3.98	
Oakfield				5.76	
Point Peter	95	46	71.2	2.88	
Poulan	96	48	74.1	6.02	
Putnam	97	48	73.6	4.14	
Quitman	93	54	74.8	9.03	
Ramsey	93	40	70.6	1.10	
Resaca				1.37	
Rome	96	43	71.9	0.85	
St. Marys	95	59	77.4	6.34	
Statesboro	97	55	75.2	7.55	
Talbotton	96	49	72.6	4.61	
Tallapoosa	98	41	71.6	1.53	
Thomasville	98	52	76.4	12.73	
Toccoa	93	46	71.4	1.92	
Valona	93	55	75.6	3.01	
Vidalia	99	55	75.6	5.53	
Washington	92	50	72.5	4.67	
Waverly	97	55	76.9	3.57	
Waycross	95	59	76.2	8.98	
Waynesboro	89	52	72.4	3.15	
Westpoint	102	47	73.6	3.82	
Woodbury	95	44	70.5	5.14	
Idaho.					
Albion	89	25	54.6	1.59	
American Falls	92	25	55.8	1.26	
Blue Lakes	92	32	60.2	0.38	
Burnside	85	27	52.2	1.26	3.5
Cambridge [f]	91	27	56.0	0.91	
Chesterfield	89[o]	15	49.2	0.88	T.
Dickey	89	24	46.6	1.75	10.0
Forney	89	19	49.6	0.96	4.0
Garnet	99	36	64.3	T.	
Grangeville	84	29	54.0	2.40	
Lake	78	18	45.4	2.10	11.0
Lakeview	76	32	53.5	2.01	
Lost River	85	25	51.4	0.40	T.
Meadows	88	22	50.4	1.32	
Moscow	85	31	54.4	1.57	
Murray	83	24	51.2	3.11	
Oakley	95	27	55.9	0.50	
Ola	92	30	57.6	1.15	
Orofino	90	31	56.4	1.60	
Payette	100	30	62.0	0.84	
Pollock	89	33	58.8	1.88	
Porthill	74	28	51.0	1.80	
Priest River	79	27	50.6	1.63	
St. Maries	87	26	54.6	1.50	
Soldier	88	19	50.6	0.39	1.0
Vernon	87	23	52.1	1.91	
Weston	94[g]	24[g]	54.8[g]	0.31	
Illinois.					
Albion	94	39	68.8	1.28	
Aledo	85	37	63.6	6.35	
Alexander	89	36	66.4	3.57	
Antioch	85	35	63.8	6.35	
Ashton	83	33	61.2	6.98	
Astoria	86	36	63.8	4.60	
Aurora	86	33	62.2	7.45	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Benton	99	40	71.4	1.97	
Bloomington	93	35	67.4	2.75	
Bushnell	90	38	66.4	4.80	
Cambridge	85	38	64.0	6.27	
Carlinville	89	37	67.0	3.69	
Carrollton	94	40	68.2	4.73	
Centralia	96	42	70.8	2.59	
Charleston	90	36	66.4	1.94	
Chester	......	......	......	2.52	
Chicago Heights	......	......	......	5.40	
Cisne	95	37	69.4	1.34	
Coatsburg	88	39	64.2	4.42	
Cobden	97	41	71.3	1.31	
Decatur	92	34	67.0	2.67	
Dixon	88	35	63.3	6.13	
Equality	96	39	70.4	0.60	
Fandon	88	38	65.0	4.25	
Flora	91	37	66.8	2.51	
Friendgrove	93	39	68.2	1.07	
Galva	87	37	63.2	5.30	
Grafton	......	......	......	5.48	
Greenville	96	41	69.9	1.84	
Griggsville	91	39	67.8	4.89	
Halfway	93	44	71.2	1.61	
Halliday	90	......	......	2.46	
Havana	91	44	67.8	5.66	
Henry	87	35	64.6	6.68	
Hillsboro	92	38	68.2	1.87	
Hoopeston	88	34	64.8	1.64	
Joliet	87	38	64.2	4.98	
Kishwaukee	87	32	61.2	6.06	
Knoxville	86	33	62.8	2.45	
Lagrange[d]	87	37	62.4	5.54	
Laharpe	90	37	65.0	7.65	
Lanark	85	26	60.3	5.64	
La Salle	94[b]	38[g]	67.0[b]	6.27	
Loami	......	......	......	3.74	
McLeansboro	95	40	70.2	1.71	
Martinsville	88	36	65.5	2.93	
Martinton	91	32	64.4	2.40	
Mascoutah	88	38	65.7	2.83	
Mattoon	88	38	64.8	2.33	
Minonk	88	34	64.4	7.14	
Monmouth	89	33	63.5	6.57	
Morrison	84	33	62.4	6.09	
Morrisonville	92	38	67.8	3.25	
Mount Carmel	......	......	......	1.38	
Mount Pulaski	90	38	66.6	3.07	
Mount Vernon	95	40	69.0	1.94	
New Burnside	98	42	73.4	0.89	
Olney	93	38	69.4	0.42	
Ottawa	88	39	65.9	6.03	
Palestine	93	35	68.2	0.73	
Pana	90	......	......	2.41	
Paris	93	40	68.3	0.71	
Peoria *a*	......	......	......	4.77	
Peoria *b*	90	37	66.3	5.78	
Philo	91	31	65.3	1.77	
Pontiac	87	37	65.2	3.62	
Rantoul	90	35	65.4	1.25	
Raum	98	41	72.2	1.94	
Riley	84	33	62.2	6.43	
Robinson	93	34	67.4	1.04	
Rockford	84	36	63.0	5.39	
Rushville	89	39	65.6	3.99	
St. Charles	87	32	62.4	6.60	
St. John	97	39	69.6	1.33	T.
Shobonier	90[d]	36[d]	68.2[d]	1.48	
Streator	88	35	63.2	7.60	
Sullivan	92	35	67.0	1.40	
Sycamore	87	35	61.6	6.88	
Tilden	94	36	69.0	1.63	
Tiskilwa	83	36	63.2	7.19	
Tuscola	91	33	65.4	1.48	
Urbana	90	35	65.6	0.99	
Walnut	88	36	64.4	6.69	
Winchester	89	33	67.0	4.16	
Winnebago	85	33	61.8	5.49	
Yorkville	85	34	63.0	6.76	
Zion	85	33	61.4	6.39	
Indiana.					
Anderson	90	36	66.5	1.23	
Angola	85	37	62.7	3.15	
Auburn	90	34	62.1	1.75	
Bloomington	91	37	67.4	1.50	
Bluffton	93	33	65.6	1.50	
Butlerville	95	35	68.5	1.90	
Cambridge City	90	33	63.4	1.64	
Columbus	94	33	66.7	0.97	
Connersville	92	35	67.8	1.07	
Crawfordsville	89[i]	35[i]	66.1[i]	0.83	
Delphi	92	34	64.7	2.53	
Elkhart	89	41	65.5	3.72	
Farmersburg	94	34	67.8	2.16	
Farmland	89	38	64.0	2.43	
Fort Wayne	87	37	63.3	1.47	
Greencastle	88	38	66.0	2.81	
Greensburg	94	34	67.6	1.02	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hammond	86	43	67.8	2.96	
Hector	90	34	63.2	1.40	
Holland	96	35	68.7	0.49	
Huntington	91	37	64.7	1.49	
Jeffersonville	93	41	69.2	0.81	
Kokomo	90	35	65.9	1.23	
Lafayette	90	35	65.4	1.96	
Laporte	85	39	62.9	4.79	
Logansport	91	37	65.2	2.12	
Madison *a*	97	39	70.2	1.11	
Madison *b*	......	......	......	0.69	
Marengo	96	35	68.4	0.69	
Marion	94	35	66.2	1.09	
Markle	92	33	64.2	0.80	
Mauzy	94	34	66.4	0.91	
Moores Hill	95	38	68.8	1.05	
Northfield	90	33	63.3	1.51	
Paoli	98	34	68.8	0.59	
Princeton	94	35	69.0	0.75	
Rensselaer	90	35	64.2	2.73	
Richmond	94	33	65.8	0.80	
Rockville	90	37	66.4	1.96	
Rome	98	33	69.0	2.20	
Salem	99	32	69.4	1.34	
Scottsburg	93	39	68.6	1.65	
Seymour	94	37	67.4	1.00	
Shelbyville	93[e]	37[e]	68.6[e]	1.33	
South Bend	89	38	64.2	3.72	
Terre Haute	92	39	69.6	2.94	
Topeka	85	38	64.0	3.86	
Valparaiso	88	36	63.2	......	
Veedersburg	90[d]	34[d]	67.4[d]	2.28	
Vevay	90	41	68.0	4.15	
Vincennes	97	37	69.4	1.30	
Washington	97	55	68.3	1.30	
Winamac	90	32	64.9	4.55	
Worthington	95	32	67.4	1.58	
Indian Territory.					
Ardmore	97	43	73.0	3.11	
Chickasha	98	38	71.2	2.36	
Durant	98	38	72.2	3.76	
Fairland	92	36	69.2	2.58	
Goodwater	97	42	71.8	2.13	
Healdton	100	36	72.8	1.83	
Holdenville	95	40	71.6	1.39	
Hugo	98	54	77.1	4.80	
Marlow	98	43	72.4	3.11	
Muskogee	95	37	69.9	1.74	
Okmulgee *d*	94	42	71.3	2.24	
Ravia	96	42	73.3	3.39	
Roff	95	41	71.4	1.85	
South McAlester	97	40	74.5	3.52	
Tulsa	......	......	......	2.20	
Wagoner	92	37	71.2	2.55	
Webbers Falls	94	37	70.0	2.72	
Iowa.					
Afton	84	34	61.0	3.38	
Albia	87	31	62.0	5.02	
Algona	85	36	60.2	3.90	
Allerton	85	35	62.4	6.90	
Alta	80	32	57.9	7.05	
Amana	84	33	61.8	4.43	
Ames	82	34	60.5	1.46	
Atlantic	87	30	61.5	2.01	
Audubon	86	30	60.2	2.92	
Baxter	83	33	60.6	1.77	
Bedford	83	32	61.9	4.00	
Belknap	87	40	66.2	5.08	
Belleplaine	84	36	58.8	3.97	
Bonaparte	84	36	63.7	5.95	
Britt	85	32	58.7	4.43	
Buckingham	......	......	......	2.19	
Burlington	88	40	66.1	5.81	
Carroll	86	30	60.2	1.74	
Cedar Rapids	86	37	61.8	4.06	
Chariton	87	35	62.0	2.78	
Charles City	83	32	57.3	2.06	
Chester	82	29	57.8	4.46	
Clarinda	88	35	61.4	2.46	
Clearlake	87	33	59.9	5.10	
Clinton	86	32	62.2	6.12	
College Springs	84	35	62.1	2.99	
Columbus Junction	84	37	63.2	5.48	
Corning	81	34	60.7	3.47	
Corydon	84	36	62.4	5.16	
Council Bluffs	......	32	......	1.71	
Cumberland	......	......	......	1.70	
Decorah	81	32	59.4	2.94	
Delaware	82	33	59.0	3.78	
Denison	84	32	60.6	1.87	
Desoto	84	36	62.4	1.81	
Dows	83	33	59.6	2.02	
Earlham	83	31	59.8	1.91	
Elkader	86	31	61.6	2.67	
Estherville	84	32	57.2	3.83	
Forest City	84	31	56.9	3.67	
Fort Dodge[e]	84	31	61.4	......	
Fort Madison	......	......	......	6.37	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Galva	84[b]	31[c]	58.6[b]	4.25	
Gilman	......	......	......	2.21	
Grand Meadow	79	35	59.0	4.27	
Greene	84	33	60.4	1.81	
Greenfield	82	33	61.4	2.15	
Grinnell	83	34	60.6	3.63	
Grundy Center	82	34	60.4	4.23	
Guthrie Center	87	32	60.6	2.88	
Hampton	86	36	61.4	2.09	
Hanlontown	82	32	58.4	4.03	
Harlan	84	31	59.7	1.90	
Hopeville	83	36	61.6	3.97	
Humboldt	90	35	61.0	5.23	
Independence[e]	81	32	59.4	3.05	
Indianola	84	36	62.1	4.23	
Iowa City	87	34	61.8	5.38	
Iowa Falls	83	31	57.8	1.45	
Jefferson	......	......	......	4.24	
Keosauqua	86	37	63.1	6.50	
Lacona	......	......	......	4.15	
Larchwood	85	28	60.0	1.92	
Larrabee	86	29	58.8	8.79	
Leclaire	......	......	......	8.23	
Lemars	84	32	57.8	3.80	
Lenox	83	35	61.8	3.70	
Leon	82	37	62.4	4.45	
Logan	94	34	61.8	1.66	
Maple Valley	......	......	......	7.83	
Maquoketa	86	30	60.5	3.48	
Marshalltown	87	33	60.6	3.07	
Mason City	82	38	60.4	4.04	
Monticello	......	......	......	4.57	
Mountayr	85	36	62.9	5.88	
Mount Pleasant	87	33	62.6	6.15	
Mount Vernon	84	33	61.5	4.64	
New Hampton	80	31[c]	57.0	1.66	
Newton	81	37	61.1	2.41	
Northwood	80	34	58.0	4.46	
Odebolt	85	32	60.6	4.68	
Ogden	90	30	60.2	2.10	
Olin	85	32	62.0	3.42	
Onawa	86	35	63.5	4.30	
Osage	81	32	58.0	3.86	
Osceola	86	35	63.8	3.61	
Oskaloosa	84	36	61.9	3.12	
Pacific Junction	84	33	61.3	2.49	
Perry	84	33	61.4	2.08	
Plover	86	33	59.6	5.65	
Primghar	83	35	58.5	3.79	
Redoak	82	39	63.0	2.84	
Ridgeway	85	32	61.0	3.13	
Rockwell City	85	34	60.6	5.26	
Ruthven	85	34	60.0	4.91	
Sac City	84	32	59.4	4.22	
St. Charles	84	36	63.0	2.70	
Sheldon	84	30	59.1	1.84	
Sibley	84	30	56.2	2.80	
Sigourney	88	34	63.0	6.86	
Sioux Center	83	30	59.0	1.51	
Stockport	......	......	......	7.34	
Storm Lake	82	32	57.6	6.49	
Stuart	85	34	60.8	3.54	
Thurman	85	32	62.2	2.87	
Tipton	87	35	64.1	5.36	
Toledo	83	31	61.0	2.64	
Vinton *[i]	82	36	60.7	4.42	
Wapello	82	38	62.9	5.47	
Washington	87	34	61.0	4.76	
Washta	......	......	......	5.19	
Waterloo	85	33	60.2	2.75	
Waukee	......	......	......	1.42	
Waverly	82	34	60.7	1.76	
Westbend	84	30	59.1	5.47	
Whitten	82	35	59.4	2.82	
Wilton Junction	85	34	63.6	4.93	
Woodburn	......	......	......	5.02	
Kansas.					
Achilles	98	21	62.2	0.36	
Alton	93	29	65.9	0.28	
Anthony	......	......	......	3.10	
Atchison	87	40	65.1	5.71	
Baker	88	36	63.8	5.57	
Burlington	92	35	67.3	7.69	
Clay Center	94	33	65.4	3.79	
Colby	100	26	64.1	0.64	
Columbus	90	37	68.2	1.23	
Dresden	96	30	63.4	0.58	
Ellinwood	94	34	67.8	0.73	
Emporia	90	39	64.7	2.41	
Englewood	98	33	72.8	0.23	
Eureka	......	......	......	4.04	
Eureka Ranch	96	28	66.0	0.79	
Fall River	92[e]	34[e]	67.8[e]	3.02	
Farnsworth	97	28	65.7	0.16	
Forsha	97	32	69.2	2.50	
Fort Leavenworth	89	42	67.0	3.55	
Fort Scott	94	37	67.6	2.60	
Frankfort	91	33	65.0	4.10	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Kansas—Cont'd.					
Fredonia	92	35	68.8	3.71	
Garden City	98	29	69.8	0.35	
Gove*[1]	92	33	63.2	0.20	
Grenola	94	33	66.4	5.31	
Hanover	91	34	64.8	2.55	
Harrison	91	29	64.1	0.57	
Hays	95	30	64.2	0.55	
Horton	88	38	64.8	5.09	
Hoxie	97	27	64.4	0.69	
Hutchinson	95	30	66.0	2.84	
Independence	95	39	70.4	1.75	
Jetmore	98[c]	33[c]	68.4[i]	0.15	
La Crosse	96	29	66.6	0.05	
Lakin	96	29	66.0	T.	
Lawrence	88	42	65.5	3.61	
Lebo	90	39	66.6	5.34	
Leoti	96	24	66.0	0.10	
Macksville	95	31	65.9	0.13	
McPherson	98	33	67.4	5.28	
Madison	91	33	65.8	6.26	
Manhattan *b*	98	35	68.0	2.98	
Manhattan *c*	96	33	65.5	2.77	
Marion	94	37	67.8	2.65	
Medicine Lodge	100	34	70.9	1.32	
Minneapolis	93	33	66.2	2.34	
Moran	91	35	68.9	1.59	
Mounthope	93	40	68.4	1.97	
Ness City	99	32	67.8	0.83	
Newton	96	31	68.4	2.21	
Norton	94	28	62.8	0.45	
Norwich	97	36	69.3	3.84	
Oberlin	.....	.....	.....	0.70	
Olathe	88	40	65.4	.....	
Osborne	.....	.....	.....	2.49	
Oswego	91	35	69.5	1.14	
Ottawa	91	33	65.8	4.90	
Paola	90[c]	36[c]	68.3[c]	5.17	
Pittsburg	91	.....	.....	1.61	
Pleasanton	91	38	67.4	2.78	
Pratt	100	32	70.9	0.40	
Republic	90	31	63.7	1.55	
Rome	98	31	70.8	0.81	
Salina	96	32	67.6	1.54	
Sedan	96	38	69.4	1.12	
Toronto	95	32	67.0	3.29	
Ulysses	98[g]	26[e]	68.4[f]	0.08	
Valley Falls	88	36	64.5	3.02	
Viroqua	96	30	66.5	0.20	
Wakeeney	.....	.....	.....	0.60	
Wallace	101	23	64.6	0.48	
Walnut	90	37	69.5	3.53	
Wamego*[1]	88	40	65.3	2.87	
Winfield	95	35	69.0	0.84	
Yates Center	93	32[c]	67.2	2.67	
Kentucky.					
Alpha	91	37	70.2	0.74	
Anchorage	97	35	68.3	0.97	
Bardstown	98	36	70.6	1.07	
Beattyville	.....	.....	.....	0.37	
Beaver Dam	98	34	68.3	1.16	
Berea	92	35	68.6	0.66	
Blandville	93	42	69.9	0.65	
Bowling Green	97	35	69.4	0.76	
Burnside	95	37	69.2	0.46	
Cadiz	100	37	70.4	T.	
Calhoun	97	33	67.8	0.27	
Catlettsburg	93	37	68.3	0.92	
Earlington	95	36	69.2	0.45	
Edmonton	95	32	68.8	0.35	
Eubank	89	34	66.0	1.59	
Falmouth	.....	.....	.....	1.30	
Fords Ferry	97	33	69.0	1.14	
Frankfort	90	38	68.4	0.72	
Franklin	92	40	70.4	1.00	
Greensburg	98	32	68.2	0.35	
Highbridge	.....	.....	.....	0.61	
Hopkinsville	96	37	69.4	0.95	
Irvington	95	37	69.7	1.30	
Jackson	93	39	68.9	0.13	
Leitchfield	94	37	68.0	1.35	
Marrowbone	95	.....	.....	0.10	
Mayfield	95	41	69.9	1.65	
Maysville	97	37	69.0	1.37	
Middlesboro	91	40	67.6	T.	
Mount Sterling	92	37	67.7	2.17	
Nerinx	93	32	67.9	0.63	
Owensboro	92	41	69.0	0.77	
Owenton	90	42	68.4	2.43	
Paducah *a*	.....	.....	.....	0.44	
Paducah *b*	98	43	72.6	0.79	
Richmond	.....	.....	.....	0.78	
St. John	93	34	67.8	0.30	
Scott	95	37	69.2	3.31	
Shelby City	95	32	68.1	0.36	
Shelbyville	97	35	69.3	2.10	
Taylorsville	96	35	67.4	0.97	
Williamsburg	93	37	67.8	0.60	
Williamstown	94	39	69.0	2.04	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Louisiana.					
Abbeville	96	50	75.8	2.86	
Alexandria	99	46	76.4	1.00	
Amite	96	46	74.8	2.04	
Baton Rouge	95	50	75.2	2.73	
Burnside	92	47	74.8	1.49	
Calhoun	91	51	73.4	2.88	
Caspiana	.....	.....	.....	0.87	
Cheneyville	95	42	73.8	1.55	
Clinton	94	46	73.4	0.43	
Collinston	96	45	73.0	1.48	
Covington	96	46	75.8	1.30	
Donaldsonville	93	54	76.6	1.60	
Emilie	91	51	73.9	1.44	
Farmerville	96	47	71.2	1.82	
Franklin	97	50	76.6	3.50	
Grand Coteau	95	50	75.3	3.69	
Hammond	93	46	74.0	0.91	
Houma	92	48	74.0	4.33	
Jennings	93	49	75.8	4.46	
Lafayette	94	47	75.2	0.80	
Lake Charles	95	50	76.6	0.72	
Lake Providence	91	48	73.0	1.48	
Lawrence	95	60	78.4	1.37	
Leesville	94	42	73.8	0.71	
Libertyhill	101	45	75.7	1.52	
Mansfield	95	42	73.0	0.85	
Melville	95	52	76.6	2.10	
Minden	100	45	75.2	0.10	
Monroe	98	51	75.0	1.29	
New Iberia	90	52	75.6	2.20	
Opelousas	95	47	74.8	2.53	
Oxford	98	42	73.8	0.00	
Plain Dealing	96	44	73.4	0.66	
Port Eads	89	68	79.2	2.16	
Rayne	96	48	76.4	2.20	
Reserve	96	50	76.0	1.85	
Robeline	95	40	72.1	0.45	
Ruston	96	.....	.....	1.43	
St. Francisville	94	46	72.4	0.09	
Schriever	95	45	73.6	1.54	
Southern University	.....	.....	.....	0.69	
Sugar Experiment Station	92	57	76.8	1.27	
Sugartown	92	50	75.4	0.95	
Venice	94	56	76.4	1.20	
Wallace	96	48	75.3	1.52	
Maine.					
Bar Harbor	90	35	60.0	1.68	
Belfast	85	31	58.5	0.84	
Cornish	90	34	61.5	1.27	
Danforth	.....	.....	.....	1.42	
Fort Fairfield	88[g]	23[g]	56.4[g]	0.60	
Farmington	90	29	59.5	1.17	
Gardiner	90	32	61.2	1.34	
Houlton	86	30	61.2	1.15	
Lewiston	90	34	62.0	1.44	
Mayfield	83	31	57.9	0.85	
Millinocket	80	37	60.0	2.82	
North Bridgton	92	33	62.5	2.16	
Orono	89	29	60.2	1.21	
Patten	84	24	56.0	0.69	
Rumford Falls	91	36	60.4	1.21	T.
South Lagrange	92	28	59.4	.....	
The Forks	.....	.....	.....	0.91	
Vanburen	83	27	58.2	1.12	
Winslow	.....	.....	.....	1.01	
Maryland.					
Annapolis	88	.....	.....	1.05	
Bachmans Valley	86	36	63.0	3.80	
Boettcherville	98	31	66.4	2.49	
Boonsboro	89	35	65.5	3.24	
Cambridge	90	41	69.6	3.04	
Charlotte Hall	90	40	66.2	2.02	
Chase	88	32	65.6	2.02	
Cheltenham	87	39	66.4	1.52	
Chestertown	84	43	66.7	0.98	
Chewsville	88	32	64.0	1.68	
Clearspring	86	36	64.4	2.75	
Coleman	91	42	68.3	1.35	
Collegepark	90	32	66.2	0.61	
Colora	80	39	64.4	2.35	
Cumberland	.....	.....	.....	2.49	
Darlington	87	38	64.2	3.06	
Deerpark	85[c]	24[c]	59.6[c]	1.10	
Denton	89	34	67.0	1.27	
Easton	90	39	67.8	2.27	
Fallston	86	38	65.6	3.16	
Frederick	94	35	67.2	2.04	
Grantsville	90	28	59.4	1.80	
Greatfalls	90	35	67.3	0.58	
Greenspring Furnace	89	37	65.0	2.62	
Hancock	94	32	67.2	2.38	
Harney	.....	.....	.....	3.25	
Jewell	86	41	67.4	0.96	
Johns Hopkins Hospital	89	42	68.8	0.91	
Laurel	90	33	66.3	0.74	
McDonogh	87	37	65.0	1.68	
Mount St. Marys College	89	41	67.2	2.87	
New Market	85	38	65.2	2.15	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Maryland—Cont'd.					
Oakland	85[c]	23[c]	57.9[c]	2.28	
Princess Anne	86	38	66.0	3.18	
Sharpsburg	85	38	65.0	3.48	
Solomons	89	47	70.1	1.72	
Sudlersville	89	38	67.4	1.61	
Takoma Park	88	38	66.6	1.03	
Van Bibber	84	39	65.8	2.37	
Westernport	88	33	63.8	1.79	
Woodstock	88	36	66.6	1.29	
Massachusetts.					
Amherst	91	30	62.0	1.66	
Bedford	83	36	61.8	1.71	
Bluehill (summit)	88	36	62.4	1.74	
Cambridge	90	35	63.5	1.67	
Chestnuthill	90	35	63.8	2.96	
Cohasset	.....	.....	.....	1.15	
Concord	90	30	60.8	2.10	
East Templeton*[1]	84	40	59.9	2.99	
Fall River	86	41	63.2	0.65	
Fitchburg *a**[1]	85	38	61.0	2.29	
Fitchburg *b*	91	35	63.0	2.46	
Framingham	89	35	62.8	1.49	
Groton	87	34	61.2	1.93	
Hyannis	.....	.....	.....	1.85	
Jefferson	.....	.....	.....	3.24	
Lawrence	93	34	63.4	1.24	
Leominster	.....	.....	.....	2.55	
Lowell *a*	91	37	65.1	1.74	
Lowell *b*	91	35	63.0	.....	
Ludlow Center	85	28	58.1	2.56	
Middleboro	88	28	60.0	0.68	
Monson	85	34	60.6	3.49	
New Bedford	84	39	61.6	1.71	
Plymouth	.....	.....	.....	1.45	
Princeton	.....	.....	.....	3.20	
Provincetown	89	43	65.0	1.62	
Somerset*[1]	90	36	64.8	0.87	
Sterling	.....	.....	.....	2.62	
Taunton	89	26	60.4	0.72	
Webster	.....	.....	.....	2.16	
Westboro	90	32	63.4	2.88	
Weston	86	29	60.6	2.11	
Williamstown	83	36	59.2	1.36	
Winchendon	.....	.....	.....	1.95	
Worcester	89	38	63.6	1.14	
Michigan.					
Adrian	92	35	63.6	1.88	
Agricultural College	84	33	61.0	2.86	
Allegan	87[c]	35[c]	62.2[c]	4.39	
Alma	88	31	60.4	5.16	
Ann Arbor	89	35	62.0	2.33	
Annpere	79	48	61.6	1.51	
Arbela	88	34	62.8	4.52	
Baldwin	86	25	59.8	6.83	
Ball Mountain	87	34	61.0	2.59	
Baraga	83	31	56.8	.....	
Battlecreek	90	37	63.2	2.93	
Bay City	90	33	60.8	8.05	
Benzonia	85[n]	33[n]	57.2[n]	3.84	
Berlin	87	34	61.2	3.55	
Berrien Springs	88	35	62.2[i]	3.45	
Big Rapids	86	27	58.6	4.38	
Birmingham	88	35[c]	62.0	1.88	
Calumet	80	37	53.8	3.17	T.
Cassopolis	92[j]	41[j]	68.0[j]	5.30	
Charlevoix	85	38	59.7	0.43	
Chatham	84	28	55.4	3.34	
Clinton	91	34	64.0	2.95	
Coldwater	90	35	64.7	4.55	
Deerpark	79	32	54.6	2.50	
Detour	78	34	56.2	3.16	
Dundee	89	37	63.4	3.03	
Eagle Harbor[j]	84	35	56.3	1.01	
East Tawas	83	30	57.7	3.73	
Eloise	89	35	63.1	2.81	
Ewen	80	24	53.0	3.36	
Fennville	86	36	61.5	4.31	
Fitchburg	87[g]	31[g]	61.8[g]	4.15	
Flint	86	32	61.5	4.04	
Frankfort[1]	79	45	59.8	.....	
Gaylord	87	32	59.4	1.35	
Gladwin	82	26	58.8	1.85	
Grand Haven	82	34	61.8	5.44	
Grand Marais	78	36	56.2	2.26	
Grape	90	35	63.2	2.66	
Grayling	85	26	58.6	4.93	
Hagar	87	39	64.0	4.07	
Harbor Beach	85	32	60.1	3.78	
Harrison	.....	32	.....	3.89	
Harrisville	83	31	57.8	3.63	
Hart	.....	37	.....	1.97	
Hastings	87	33	62.0	3.82	
Hayes	87	30	58.8	6.05	
Highland Station	.....	.....	.....	3.33	
Hillsdale	88	33	61.8	3.16	
Humboldt	81	25	53.2	.....	
Ionia[d]	85	32	61.8	.....	
Iron Mountain	81	23	56.4	4.71	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Michigan*—Cont'd.**					
Iron River	80	27	53.9	6.60	T.
Ironwood	81	28	55.6	3.77	
Ishpeming	80	28	54.6	4.50	T.
Ivan	84	29	56.9	3.86	
Jackson	91	35	63.9	2.55	
Jeddo	86	35	61.6	3.10	
Lake City		26		0.94	
Lansing	87	36	61.9	3.92	
Lapeer	88[c]	36[c]	61.4[c]	3.62	
Lincoln	83				
Ludington	84	36	60.4	0.27	
Mackinac Island	76	36	56.6	3.49	T.
Mackinaw	78	37	57.7	4.70	
Mancelona	86	30	61.0	0.65	
Manistee	84	34	59.8	0.40	
Manistique	76[c]	35[c]	56.0[c]	5.11	T.
Marine City	85	34	63.8	1.93	
Menominee	79	31	58.0	4.68	
Midland	88	32	61.4	5.40	
Mio	85	26	57.0	3.99	T.
Montague	81[d]	34[d]	60.4[d]	2.72	
Mount Pleasant				5.25	
Muskegon	83	36	61.4	5.78	
Newberry		30		2.33	
Old Mission	87	36	59.2	4.43	
Olivet	83	38	61.2	5.03	
Omer	84	27	57.1	3.48	T.
Onaway	86	31	58.0	3.38	
Ontonagon	86	34	54.7	4.53	
Ovid	85	36	61.8	3.46	
Owosso		36		1.45	
Petoskey	89	35	59.2	3.37	
Roscommon	85[d]	20[d]	58.0[d]	4.57	
Saginaw (W. S.)	89	34	61.9	5.60	
St. Ignace				2.43	
St. Johns	85	37	63.2		
St. Joseph	86	42[j]	60.6[f]	2.05	
South Haven	87	39	63.1	2.59	
Thomaston	81	24	54.2	3.37	
Thornville	85	37	62.0	4.39	
Traverse City	83	32	59.4	3.98	
Vassar	87	29	62.9	1.95	
Wasepi	85	37	61.6	3.15	
Waverly	86[c]	39[c]	62.4[c]	3.91	
Webberville	88	33	62.6	4.36	
West Branch	85[n]	29[n]	55.4[n]	0.69	
Wetmore				2.35	
Whitefish Point	75	36	54.2	2.86	
Ypsilanti	86	32	60.2	2.98	
Minnesota.					
Albert Lea	82	35	57.4	6.20	
Alexandria	84	31	53.8	3.39	
Angus	82	24	51.0	4.18	
Ashby	81[c]	26[c]	54.0[c]	4.08	
Beardsley	85	27	55.8	3.95	
Bemidji	79	31	54.6	4.27	
Bird Island	84	30	58.2	7.01	
Blooming Prairie	81	32	57.1	6.90	
Caledonia	80	30	57.1	4.73	
Campbell	83	26	54.0	3.43	
Collegeville	84	35	57.4	3.64	
Crookston	78	29	51.3	3.78	
Deephaven				5.95	
Detroit	80	26	51.9	3.50[a]	
Duluth (sub station)	80	32	52.2	4.84	
Faribault	83	31	58.2	5.90	
Farmington	83	32	57.0	7.91	
Fergus Falls	78	28	54.5	4.05	
Floodwood	85	20	52.4	5.75	
Glencoe	84	34	58.1	6.77	
Grand Meadow	82	34	57.1	6.44	
Lake Winnibigoshish	79	28	53.6	4.78	
Leech	80	22	50.6	4.95	
Long Prairie	84	28	54.8	5.32	
Luverne	82	30	56.6	3.24	
Lynd	85	29	57.4	4.08	
Mapleplain	84	33	56.8	6.81	
Milaca	83	29	55.4	5.43	
Milan [c]	86	29	55.4	3.79	
Minneapolis [1]	84[k]	33	56.9	8.68	
Montevideo	88	31	56.8	5.46	
Morris	84	30	55.1	4.17	
Mount Iron	86	23	51.2	7.45	
New London	88	33	57.2	4.62	
New Richland	86	32	59.4	3.91	
New Ulm	83	35	57.6	7.42	
Park Rapids	80	27	50.8	5.44	
Pine River	79	23	53.5	6.75	
Pipestone	83	29	55.6	2.96	
Pokegama Falls	85	19	52.3	5.90	
Redwing *a*				11.74	
Redwing *b*	83	35	59.6	10.07	
Reeds				10.58	
Rolling Green	84	38	58.0	4.25	
St Charles	86	28	59.4	5.85	
St. Cloud	85	34	56.0	5.20	
St. Peter	84	34	59.2	8.79	
Sandy Lake Dam	83	26	53.5	6.30	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Minnesota*—Cont'd.**					
Shakopee	84	35	59.0	7.56	
Tower	75	29	50.0	5.90	T.
Two Harbors	79	28	52.3	6.94	
Wabasha	86	33	61.0	9.77	
Warroad	82	24	50.3		
Winnebago	89	39	57.8	4.59	
Winona	80	35	59.8	4.45	
Wyoming				5.33	
Zumbrota	84	25	57.4	7.17	
Mississippi.					
Aberdeen	98	40	72.2	T.	
Agricultural College	96	48	74.2	T.	
Austin	94	41	70.2	0.72	
Batesville	93	40	70.0	0.40	
Biloxi	96	40	77.4		
Boggan	95	43	72.8	1.34	
Booneville	93	43	71.4	0.18	
Brookhaven	97	47	73.8	0.40	
Canton	99	40	73.6	0.38	
Columbus	94	43	72.4	T.	
Corinth	92	41	68.8	0.60	
Crystal Springs	95	45	73.8	0.30	
Duck Hill				T.	
Edwards	97	43	74.4	0.49	
Fayette	93	45	72.4	1.82	
Fayette (near)				1.30	
Greenville *a*	91	50	72.8	0.38	
Greenville *b*	98	47	74.2	0.36	
Greenwood	99	42	72.6	0.59	
Hattiesburg	98	41	74.4	1.20	
Hazlehurst	99	48	74.8	0.40	
Hernando	99	47	74.4	0.20	
Holly Springs	94	49	72.8	0.38	
Indianola	96	44	71.3	1.20	
Jackson	93	48	74.0	0.38	
Kosciusko	96	42	72.8	0.22	
Lake	93	41	71.2	0.05	
Lake Como	100	39	74.7	0.31	
Leakesville	99	45	75.8	1.59	
Louisville	98	43	74.4	0.00	
McNeill	96	50	76.4	1.65	
Macon	98	42	73.4	T.	
Magnolia	95	42	73.2	1.28	
Natchez	96	51	76.1	0.50	
Nittayuma	94	45	71.4	1.25	
Okolona	101	41	73.7	0.02	
Patmos				0.98	
Pearlington	95	48	75.6	2.59	
Pittsboro	99	39	73.4	T.	
Pontotoc	94	44	73.6	0.61	
Port Gibson	96	43	72.9	1.34	
Ripley	93	38	69.6	0.30	
Shoccoe	96	42	71.5	0.12	
Stonington				2.30	
Suffolk	96	45	74.3	0.80	
Swartwout	96	49	76.2	0.91	
Thornton	96	44	75.0	1.55	
Tupelo	99	38	72.2	0.05	
University	97	44	74.0	T.	
Utica	95	44	74.6	0.55	
Walnutgrove	95	43	72.4	0.51	
Watervalley	97	41	75.0	T.	
Waynesboro	94	42	72.6	T.	
Woodville	93	48	74.9	1.51	
Yazoo City	97	44	72.8	1.75	
Missouri.					
Appleton City	95	35[c]	67.6	3.06	
Arthur	92	36	67.3	3.09	
Avalon		38		8.58	
Bethany	85	36	62.0	5.38	
Birchtree	91[f]	39[j]	66.1[h]	4.16	
Blue Springs	90	37	65.0	6.07	
Boonville				4.28	
Brunswick	89	40	65.4	7.01	
Carrollton	88[c]	37[c]	66.8[c]	5.78	
Caruthersville	98	40	70.6	1.84	
Conception	86	38	63.6	6.08	
Darksville	88	38	65.4	5.98	
Dean	92	33	67.5	3.12	
Desoto	92	37	68.2	2.09	
Downing				5.46	
Edgehill	93	34	65.3	2.78	
Edwards	94	34	66.4	3.48	
Eightmile *[2]				3.98	
Fairport				7.61	
Fayette	92	38	67.7	4.33	
Fulton	93	36	67.0	4.70	
Gallatin *[1]	86	44	66.2	8.32	
Gano				2.77	
Glasgow	92	38	66.4	4.56	
Gorin				5.47	
Grant City	84	38	63.0	4.38	
Halfway	92	36	67.0	3.48	
Harrisonville	92	33	65.8	4.83	
Hazlehurst				4.04	
Hermann				6.21	
Houston	91	33	65.6	5.01	
Huntsville	90	39	66.4	7.76	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Missouri*—Cont'd.**					
Ironton	95	32	66.8	2.21	
Jackson	96	39	70.0	2.41	
Jefferson City	94	39	67.2	2.65	
Joplin	89	38	68.9	1.33	
Kidder	86	37	64.0	4.87	
Koshkonong	93	38	67.6	5.09	
Lamar	93	36	69.4	0.72	
Lamonte				4.16	
Lebanon	91	36	67.4	4.63	
Lexington	90	37	66.5	5.62	
Liberty	90	37	65.2	4.92	
Louisiana	90	38	66.1	5.99	
Macon	90	37	66.0	5.14	
Marblehill	98	38	68.6	2.29	
Marshall	90	35	65.2	5.29	
Maryville	85	37	62.2	5.64	
Mexico	92	37	67.2	5.66	
Miami *[5]	97	41	67.1	5.93	
Monroe City	89	37	65.2	5.26	
Montreal	92	33	65.3	8.12	
Mountaingrove	90	36	66.4	5.27	
Mount Vernon	95	32	66.9	2.20	
Neosho	90	34	67.4	2.12	
Nevada				1.60	
New Haven	96	40	70.4	4.37	
New Madrid				1.26	
New Palestine	94	37	67.6	4.23	
Oakfield	93	40	69.2	2.91	
Olden	93	34	67.2	3.87	
Oregon	85	39	63.4	4.55	
Palmyra *[6]	88	40	65.6	3.40	
Pine Hill				2.57	
Princeton	89	39	63.6	5.56	
Protem	94	37	68.3	2.51	
Richmond				5.45	
Rockport				3.42	
Rolla				7.67	
St. Charles	92	40	70.0	3.81	
St. Joseph				6.46	
Sarcoxie				1.57	
Sedalia	90	38	66.6	5.76	
Seymour	88	35	66.0	2.79	
Shelbina				4.37	
Sikeston	95	39	69.6	1.25	
Steffenville	88	37	65.2	3.61	
Sublett	88	37	64.2	6.85	
Trenton	85	40	63.8	4.85	
Unionville	84	38	63.6	8.41	
Vichy	93[d]	35[d]	66.2[d]	5.41	
Warrensburg	89	37	67.3	2.81	
Warrenton	95	38	67.0	6.14	
Wheatland				3.28	
Willowsprings	91	33	65.2	6.10	
Zeitonia	95	32[d]	66.0	2.68	
Montana.					
Adel	75	20	48.2	1.27	3.0
Anaconda	82	23	51.2	1.35	5.0
Augusta	80	21	50.6	0.75	2.0
Boulder	80	25	50.2	0.91	4.9
Bozeman	81	28	50.4	1.11	0.2
Butte	79	24	50.8	0.50	5.0
Canyon Ferry	85	28	54.2	0.43	0.0
Chinook	89	25	55.9	0.54	T.
Columbia Falls	77	21	49.8	1.56	T.
Crow Agency	83	29	56.0	1.80	T.
Culbertson	85	27	52.6	1.21	T.
Deerlodge	80	22	50.2		
Dillon	86	24	50.8	1.45	T.
Fort Benton	82	32	52.8	0.65	
Fort Logan	77	22	48.8		
Glasgow	86	19	55.0	0.14	
Glendive	90	28	53.1	1.40	T.
Greatfalls	80	30	56.1	0.99	T.
Hamilton	81	28	54.0	0.96	
Hayden	78	26	51.2	2.56	
Kipp	76	18	48.2	0.48	T.
Lamedeer	87	32	58.8	0.98	
Lewistown	84	28	51.2	2.42	1.0
Livingston	88	28	54.2	1.75	1.0
Marysville	76	21	48.9	1.94	7.5
Ovando	84	21	49.3	2.33	
Parrot	86	29	54.0	0.84	T.
Plains	79	27	52.8	1.77	
Poplar	86	25	53.6	0.64	T.
Redlodge	76	16	47.4	2.41	17.0
St. Pauls	83	26	52.4	0.81	T.
St. Peter	76	25	49.0	2.52	8.0
Springbrook	85	23	53.0	1.29	
Summit	71	20	44.0		
Toston	85	26	52.8	0.90	
Townsend				0.40	
Troy	82[c]	23[c]	50.4[c]	1.78	
Twin Bridges	83	25	50.0		
Twodot	83	23	51.6	1.80	8.0
Utica	84	27	52.8	2.42	2.0
Wolf Creek	88	27	52.8	2.55	3.5
Wolsey	74	18	43.5	2.10	2.0
Yale	83	28	52.1	1.24	6.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Temperature. (Fahrenheit.) Minimum.	Temperature. (Fahrenheit.) Mean.	Precipitation. Rain and melted snow.	Precipitation. Total depth of snow.
Nebraska.	°	°	°	*Ins.*	*Ins.*
Agate	89	27	54.0	1.00	7.0
Agee *[1]	94	31	57.8	1.13	
Albion	90	27	60.6	0.47	
Alliance	96	26	56.6	1.21	3.5
Alma	92	26	64.6	0.78	
Ansley	95	22	60.2	0.60	
Arapahoe				1.10	
Arcadia				0.50	
Ashland *a*	89	32	64.3	2.84	
Ashton				0.43	
Auburn	88	33	64.4	4.10	
Aurora				0.69	
Bartley	97	25	63.3	1.35	
Beatrice	89	33	63.6	5.17	
Beaver	94	27	65.2	0.24	
Bellevue				2.76	
Benedict				2.40	T.
Benkleman				1.10	
Blair	86	32	59.9	3.82	
Bluehill				0.45	
Bradshaw				1.34	
Bridgeport	97	26	58.2	1.23	2.0
Brokenbow	94	22	61.0	0.50	
Burchard				5.07	
Burwell				0.08	
Callaway	93	21	58.4	0.30	
Cedar Rapids				0.54	
Central City				1.04	
Chester				1.35	
Cody				0.66	3.0
Columbus	86	32	60.6	2.65	
Crete	89	33	63.1	1.32	
Culbertson	98	20	60.8	0.77	
David City	84	31	61.6	2.33	
Dawson	88	36	64.8	4.82	
Edgar				0.74	
Ericson				T.	
Ewing				0.48	
Fairbury	93	30	62.9	1.87	
Fairmont	88	32	60.3	1.09	
Fort Robinson	90	29	57.0	1.17	3.0
Franklin	92[e]	24[e]	61.1[e]	0.20	
Fremont	87	32	61.4	2.89	
Fullerton				1.91	
Geneva	90	29	61.4	1.17	
Genoa (near)	89	30	61.8	1.43	
Gordon				0.70	2.0
Gothenburg	96	22	62.2	0.33	
Grand Island *b*	91	28	62.3	1.27	
Greeley				0.80	
Guide Rock				0.47	
Haigler				0.82	
Halsey	97	23	60.2	0.30	
Hartington	90	30	59.4	0.97	
Harvard	87	30	61.0	0.83	
Hastings *[1]	88	33	62.0	0.60	
Hayes Center				0.64	
Hay Spring [f]	88	26	53.8	1.92	
Hebron	89	31	63.4	1.31	
Hickman				2.90	
Holbrook				0.78	
Holdrege	92	29	63.9	0.40	
Hooper *[1]	86	34	60.7	3.32	
Imperial	98	23	62.0	0.02	T.
Johnstown				2.00	T.
Kearney	91	27	63.2	0.52	
Kennedy	93	20	60.2	1.30	2.0
Kimball	90	22	56.2	1.05	2.0
Kirkwood	97	26	60.6	1.49	
Leavitt	89	30	62.1	2.41	
Lexington	89	25	60.0	0.81	
Lockridge	91	30	62.8	1.19	
Lodgepole	95	27	57.7[e]	0.55	
Loup	95	23	60.3	1.20	
Lynch	99	24	62.0	1.96	
Lyons				6.02	
McCook				0.65	
McCool Junction				1.06	
Madison	86	31	60.7	1.53	
Madrid	98	22	61.0	0.00	
Marquette				1.60	
Mason				0.80	
Minden	91	26	61.4	0.73	
Monroe				1.54	
Nebraska City *c*	88	34	60.6	2.70	
Nemaha				3.60	
Norfolk	90	25	60.8	0.96	
North Loup	98	25	61.2	0.71	
Oakdale	93	27	59.3	1.57	
Odell				3.25	
O'Neill	96	26	61.2	0.90	
Ord				0.06	
Osceola				1.62	
Palmer				1.46	
Palmyra *[1]	86	34	63.2	2.22	
Pawnee City				4.60	
Plattsmouth *b*				2.16	
Purdum	94	23	59.8	0.77	
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Ravenna *a*	93	25	61.5	0.51	
Redcloud	92	29	63.0	0.28	
Republican				0.62	
Rulo				7.66	
St. Libory				1.36	
St. Paul	93	26	62.6	0.52	
Salem				4.28	
Santee	95	30	62.2	1.26	
Schuyler				2.17	
Seward				1.59	
Smithfield				0.62	
Spragg				0.64	
Springview	94	23	60.2	2.93	
Stanton	86	29	60.8	1.66	
Strang				1.23	
Stratton				0.76	
Stromsburg				1.50	
Superior	90	30	61.6	0.60	
Syracuse				2.14	
Tablerock				4.51	
Tecumseh *c*				4.43	
Tekamah	97	34	62.9	3.83	
Turlington	89	34	63.0	2.60	
University Farm	88	32	63.6	1.39	
Wahoo				1.56	
Wakefield	88	27	60.5	1.58	
Wallace				0.30	
Wauneta				0.67	
Weeping Water				3.01	
Westpoint	88	30	62.5	3.81	
Wilber				1.84	
Wilsonville				0.68	
Winnebago	87	26	59.9	4.55	
Wisner				3.96	
Wymore				3.95	
York	90	31	63.3		
Nevada.					
Austin	85	27	57.8	T.	
Battle Mountain	104	25	62.6	0.00	
Belmont	89	27	56.6	0.51	
Candelaria	90	35	64.1	0.02	
Carson City	91	25	58.3	T.	
Cranes Ranch				0.12	
Dyer	85	21	55.0	T.	
Elko	92	28	55.6	0.15	
Ely	88	26	57.0	1.10	
Eureka	91	25	59.8	T.	T.
Fallon	94	29	59.9	0.00	
Fenelon *[1]	93	30	56.5	T.	T.
Golconda *[1]	94	38	64.4	T.	
Halleck *[1]	96	32	58.1	0.50	
Hawthorne	97	36	63.8	0.00	
Humboldt	93	29	59.7	0.00	
Lee				0.07	
Lewers Ranch	89	28	60.7	0.10	
Lovelocks	97	32	62.2		
Martins	97	27	62.1	T.	
Mill City *[1]	82	45	57.6	0.00	
Morey	93	27	60.4	1.60	T.
Palisade	91	35	66.0	0.08	
Palmetto	88	23	56.4	T.	
Potts	100	17	54.4	0.25	
Reno State University	93	30	60.0	T.	
Rioville	114	48	80.0	0.79	
Silverpeak	98	37	66.8	0.00	
Sodaville	102	35	65.0	0.21	
Tecoma	85	25	56.0	0.00	
Toano *[5]	103	33	61.0	0.12	T.
Wabuska	94	22	58.3	0.00	
Wadsworth				0.10	
Wells				0.05	
Wood	93	26	56.4	0.47	
New Hampshire.					
Alstead	85	30	59.4	1.38	
Bartlett				1.43	
Berlin Mills	90	25	58.2	0.80	
Bethlehem	84	30	58.2	0.80	
Brookline *[1]	92	28	61.2	2.15	
Chatham	93	29	58.8	1.70	
Concord	88	26	60.1	1.29	
Durham	91	31	62.3	1.73	
Franklin Falls	85	28	59.4	3.28	
Grafton	90	25	58.3	1.00	T.
Hanover	90	27	60.0	1.17	
Jefferson				1.23	
Keene	91	25	60.0	1.88	
Littleton	86	28	59.0	0.88	T.
Nashua	92	32	62.7	2.82	
Newton	90	27	60.5	1.52	
North Woodstock				1.52	
Plymouth	89	25	60.4	0.73	
Sanbornton	87	29	59.8	1.10	
Stratford	95	29	60.3	0.52	
New Jersey.					
Asbury Park	88	42	65.8	1.72	
Barnegat	90	35	65.4	3.25	
Bayonne	90	42	66.8	5.56	
Belvidere	88	35	64.5	1.95	
New Jersey—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bergen Point	88	40	65.2	7.10	
Beverly	89	37	66.6	3.09	
Blairstown	87	31	63.3	1.45	
Bridgeton	90	38	67.7	3.90	
Canton				2.31	
Cape May C. H	86	36	65.9	3.63	
Charlotteburg	88	29	61.9	3.29	
Clayton	85	36	65.0	2.12	
College Farm	87	35	65.1	3.69	
Dover	86	32	60.9	3.39	
Elizabeth	89	38	65.8	3.88	
Essex Falls	90[e]	35[e]	63.4[e]	3.80	
Flemington	88	35	66.0	3.89	
Friesburg	88	36	66.0	3.38	
Hightstown	89	38	64.7	4.74	
Imlaystown	86	39	65.6	3.22	
Indian Mills	92	34	66.3	3.28	
Lakewood	86	37	65.0	3.35	
Lambertville	87	36	65.6	4.27	
Layton	88	29	60.9	1.39	
Moorestown	88	36	65.8	4.42	
Newark	89	39	65.2	4.56	
New Brunswick	88	38	66.0	3.23	
Newton	87	33	62.0	1.67	
Oceanic	85	40	65.2	1.70	
Paterson	90	40	66.0	2.88	
Pemberton	87	34	64.8	3.49	
Phillipsburg	88	36	65.0	1.47	
Plainfield	89	34	64.6	4.38	
Pleasantville				2.95	
Rancocas				3.76	
Ringwood	90	30	62.8	3.06	
Rivervale	88	32	63.0	2.90	
Salem	90	37	68.0	2.62	
Somerville	89	33	64.4	4.93	
South Orange	85	36	63.1	3.80	
Sussex	85	33	63.0	1.66	
Toms River	91	31	64.8	3.50	
Trenton	85	43	66.4	4.50	
Tuckerton	88	34	65.5	2.87	
Vineland	89	36	65.2	4.26	
Woodbine	85	32	65.0	4.58	
Woodstown				3.04	
New Mexico.					
Alamagordo	100	42	73.2	1.16	
Albert	97	39	73.0	T.	
Albuquerque	94	30	64.0	1.93	
Alma	100	32	67.2	2.91	
Arabela	90	42	67.0	1.82	
Bellranch				0.89	
Cambray				1.43	
Carlsbad	101	41	76.0	1.83	
Cloudcroft	71	26	50.8	1.85	
Deming				2.84	
Dorsey	88	31	61.6	0.38	
Eagle Rock Ranch	84	29	59.2	0.04	T.
Engle	93	41	67.8	1.28	
Fort Bayard	91	38	65.0	3.36	
Fort Stanton	86	29	61.4	1.55	
Fort Union	88	30	59.0	1.93	T.
Fort Wingate	84	32	59.6	1.77	
Gage				2.84	
Galisteo	85	41	63.5	0.10	
Golden				0.12	
Las Vegas	88	33	60.2	1.11	
Lordsburg				0.93	
Los Lunas	91	36	64.4	1.85	
Luna	84	24	57.8	3.18	
Mesilla Park	97	42	70.9	2.43	
Mountainair	88	25	60.2	0.36	
Raton	88	34	63.0	0.20	
Roswell				0.92	
San Marcial	102	35	70.2		
Strauss				4.15	
Taos	93	32	60.2	0.30	
Winsors	76	20	48.6	0.32	
New York.					
Adams				1.34	
Addison	92	31	62.2	1.81	
Akron				0.65	
Alden	87	38	62.8	0.96	
Amsterdam	90	35	62.2	1.17	
Angelica	87	28	60.3	1.80	
Appleton	92	34	63.4	0.59	
Athens	87	38	63.0	3.24	
Atlanta	87	30	60.0	2.06	
Auburn	88	33	63.0	1.85	
Avon	87	33	61.4	1.19	
Baldwinsville	89	36	63.4	1.14	
Bedford	88	34	62.6	4.80	
Berlin	87	31	58.9	1.57	
Blue Mountain Lake				1.80	
Bolivar	88	25	59.5	2.48	T.
Bouckville	87	35	60.7	1.66	
Boyds Corners				2.61	
Brockport	91	35	63.3	0.66	
Caldwell	84	36	60.0	1.96	
Canajoharie	86	33	60.3	1.46	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Canaan Four Corners	85[c]	32[c]	57.7[c]	1.72	
Carmel	84	35	60.0	2.69	
Carvers Falls	88	33	60.4	1.04	
Chazy	88	34	61.0	0.58	
Cooperstown	83	34	58.6	1.64	
Cortland	86	32	61.7	2.07	
Cutchogue	89	40	64.2	1.25	
Dekalb Junction	87	36	61.2	1.79	
De Ruyter	86	32	59.8	1.87	
Easton				1.75	
Elba	88	36	61.6	0.98	
Elmira	93	32	64.5	1.47	
Fayetteville	91	35	64.4	1.03	
Franklinville	87	23	59.8	3.04	
Gabriels	87	24	56.5	0.85	
Gansevoort				1.50	
Glens Falls	88	30	60.6	1.53	
Gloversville	88	32	59.6	0.64	
Greenwich	84	34	60.7	1.25	
Griffin Corners	85	25	57.1	1.61	
Harkness	87	37	61.2	0.34	
Haskinville				2.22	
Hemlock	82	40	62.8	1.57	
Homer	85	32	59.7	1.74	
Honeymead Brook	83	32	60.2	1.39	
Indian Lake	85	26	55.6	1.36	T.
Ithaca	86	37	61.6	1.21	
Jamestown	88	28	62.6	1.71	
Jeffersonville	88	28	61.0	1.85	
Keene Valley	91	29	59.2	1.30	
King Ferry				1.18	
Liberty	84	33	59.3	1.86	
Littlefalls, City Res.	86	34	60.5	1.02	
Lockport	86	38	63.4	0.60	
Lowville	87	33	58.8	1.50	
Lyndonville				0.45	
Lyons	92	35	66.1	2.04	
Middletown	85	40	62.6	2.30	
Mohonk Lake	81	37	60.7	1.71	
Moira	90	35	62.0	0.52	
Mount Etrick	83	35	59.4	1.30	T.
Newark Valley				1.26	
New Lisbon	84	26	56.8	1.57	
North Hammond				1.27	
North Lake				1.08	
Number Four	81	31	56.4	1.77	
Nunda	88	30	62.0	2.04	
Ogdensburg	86	32	60.7	1.21	
Oneonta	91	31	62.4	1.44	
Otto	86	35	62.8	1.20	
Oxford	83	31	60.4	1.52	
Oyster Bay	86	43	65.4	2.55	
Palermo				2.21	
Penn Yan	89	37	63.8	1.98	
Perry City	84	33	59.9	0.99	
Plattsburg Barracks	90	33	58.6	0.10	
Port Jervis	92	34	63.3	1.52	
Potsdam	87	35	61.6	0.87	
Primrose	90	34	63.2	3.35	
Redhook				1.49	
Richmondville	87	35	60.3	1.23	
Ridgeway	87	38	63.5	0.61	
Rome	90	35	62.6	1.20	
Romulus	88	36	63.2	1.61	
Salisbury Mills				2.82	
Saranac Lake	87	28	57.8	0.83	T.
Saratoga Springs	89	34	60.3	1.50	
Scottsville				1.14	
Setauket	85	42	63.8	2.61	
Shokan				3.18	
Shortsville	87	36	63.2	1.77	
Skaneateles				1.80	
Southampton	81	39	63.2	1.24	
South Butler	88	33	62.4	2.16	
South Canisteo	86	31	60.2	1.98	
Southeast Reservoir				3.67	
South Kortright	87	24	58.4	1.64	
South Schroon	85	32	57.8	1.51	
Speer Falls	89	34	61.2	1.22	
Straits Corners	93	27	59.3	0.46	
Ticonderoga	87	36	62.6	0.97	
Volusia	85	31	61.1	3.33	
Walton	87	30	59.6	2.56	
Wappinger Falls	86	38	62.6	1.54	
Warwick				1.80	
Watertown	86	36	62.0	1.44	
Waverly	89	30	61.8	1.85	
Wedgwood	85	34	61.1	1.51	
Wells	87	27	57.9	1.60	
West Berne	91	28	59.6	1.43	
Westfield *b*	86	36	63.4	2.70	
Windham	85	29	58.7	1.53	
Youngstown				0.90	
North Carolina.					
Brevard	86	33	65.2	2.74	
Bryson City				0.12	
Chapelhill	91	43	71.4	1.31	
Currituck				4.88	
North Carolina—Cont'd.					
Edenton	89	44	71.6	0.81	
Fayetteville	90	44	71.3	1.98	
Flatrock	87	33	64.3	4.26	
Goldsboro	88	44	70.2	2.01	
Graham				4.83	
Greensboro	88	45	68.4	3.20	
Henderson	88	44	68.8	2.34	
Hendersonville	87	36	65.0	3.52	
Henrietta	94	43	71.4	2.02	
Highlands	80	29	58.9	8.87	
Horse Cove	83	39	63.6	5.56	
Jefferson	85	33	61.8	2.20	
Kinston	88	41	71.5	0.89	
Lenoir	90	38	67.0	2.49	
Linville	80	27	57.8	4.97	
Littleton	89	43	68.2	2.66	
Louisburg	87	44	69.8	1.88	
Lumberton	90	44	71.6	1.26	
Marion	92	41	68.3	3.15	
Mocksville	92	52	70.8	5.30	
Moncure	89	38	68.0	1.20	
Monroe	91	38	69.7	3.03	
Morganton	90	39	67.6	3.16	
Mountairy	91	38	67.0		
Murphy				0.53	
Nantahala Park	80	31	59.2	5.71	
Newbern	89	46	72.2	1.04	
Patterson *[1]	84	36	62.2	1.73	
Penelo *	88	41	69.8	2.45	
Pittsboro	93[c]	39	70.8	2.00	
Reidsville	91	44	68.5	3.45	
Rockingham	90	45	71.4	1.51	
Roxboro	89	42	68.2	3.43	
Salem	87	42	67.8	2.88	
Salisbury	92	44	71.0	3.93	
Saxon	90	42	67.8	1.53	
Selma	92	42	71.3	3.06	
Settle *[5]	92	43	70.4	5.31	
Sloan	92	43	71.2	1.57	
Soapstone Mount	89	38	68.1	3.92	
Southern Pines *a*	92	45	72.4	1.60	
Southern Pines *b*	92	45	72.3	2.30	
Springhope	89	42	71.9	2.20	
Statesville	90	39	68.0	5.05	
Washington	91	43	72.1	0.45	
Waynesville	84	38	63.0	0.80	
Weldon *a*	94	42	71.6	1.69	
Weldon *b*				1.68	
Whiteville	93	43	71.4	2.92	
North Dakota.					
Amenia	83	24	53.1	3.68	
Ashley	79	22	50.8	2.30	
Berlin	82	23	51.6	3.22	T.
Buxton	82	25	53.5	3.81	
Churchs Ferry	80	23	49.4	2.16	
Coalharbor	80	30	57.8	2.47	0.8
Devils Lake	85	24	49.7	1.56	
Dickinson	87	20	53.6	3.70	5.0
Donnybrook				2.77	12.0
Edgeley	83	28	53.4	3.07	0.7
Elbowoods	82	21	52.4	3.65	12.5
Ellendale	85	27	55.9	3.34	
Fargo	83	22	52.0	5.61	
Forman	82	27	54.2	2.30	
Fort Yates	84	27	55.1	2.00	0.2
Fullerton	82	25	52.4	3.08	1.5
Glenullin	79	26	52.0	2.81	4.6
Grafton	79	30	51.6	3.95	
Hamilton	81	27	50.0	3.88	T.
Jamestown	83	27	53.2	2.28	1.8
La Moure				2.56	
Langdon	81	21	46.6	2.88	
Larimore	84	26	50.6	2.76	
Lisbon	82	23	52.3	4.34	
McKinney	82	20	48.4	1.62	12.0
Manfred	79	24	50.8	2.34	2.0
Mayville	84	26	52.2	4.38	
Medora	83	26	53.8		
Melville	82	27	52.2	2.45	
Milton	76	24	47.8	2.55	
Minnewaukon	81	25	50.8	1.90	
Minot	90	29	53.1	3.95	10.0
Minto	82	26	51.6	3.31	
Napoleon	83	23	52.4	1.84	1.0
New England [4]	85	18	50.2	2.60	4.0
Oakdale	81	20	52.4	1.91	1.0
Palermo	80	30	54.6	2.05	5.0
Pembina	81	26	49.4	4.48	
Portal	75	23	46.4	1.72	6.0
Power	82	25	54.0	2.76	
Steele	78	24	50.4	2.04	
University	80	27	51.4	3.65	
Wahpeton	80	28	55.4	3.22	
Willow City	80	18	47.1	3.48	
Wishek	80	22	52.6	2.30	
Ohio.					
Akron	87	38	65.0	0.89	
Atwater				0.87	
Ohio—Cont'd.					
Bangorville	91	36	67.6	3.17	
Bellefontaine	92	33	63.6	0.94	
Bement				2.47	
Bladensburg	94	30	64.0	1.16	
Bloomingburg				1.94	
Bowling Green	93	34	64.5	2.30	
Bucyrus	91	34	64.2	1.60	
Cadiz	90	36	65.8	1.21	
Cambridge	94	30	65.8	0.33	
Camp Dennison	96	34	67.8	1.56	
Canal Dover	88	33	63.0	0.34	
Canton	85	35	63.2	0.77	
Cardington	92	32	64.4	1.69	
Cedarville				0.97	
Chillicothe	98	31	68.7	1.00	
Circleville	94	38	68.0	0.98	
Clarington	94	37	68.0	0.36	
Clarksville	96	35	68.7	1.71	
Cleveland *a*	86	40	64.2	2.81	
Cleveland *b*	88	42	63.8	2.41	
Coalton	95	29	67.0	0.67	
Colebrook *	89	30	61.6	2.07	
Dayton *a*				0.45	
Dayton *b*	98	35	67.4	0.65	
Defiance	94	34	64.0	2.45	
Delaware	95	33	65.4	3.17	
Elyria	89	37	63.8	1.82	
Findlay	95	36	66.2	2.29	
Frankfort	93	35	66.4	0.95	
Fremont	92	39	66.0	1.80	
Garrettsville	88	31	62.2	2.43	
Granville	94	33	65.6	0.99	
Gratiot	92	33	65.8	1.40	
Green	93	36	67.7	1.80	
Greenfield	92	40	67.0	1.14	
Greenhill	90	29	62.0	0.30	
Greenville	90	37	65.2	1.23	
Hanging Rock	94	36	68.2	0.43	
Hedges	93	33	64.8	1.57	
Hillhouse	88	30	62.2	2.70	
Hiram	86	38	62.8	1.44	
Hudson	90	32	63.5	2.90	
Jacksonboro	97	40	69.7	0.54	
Kenton	95	33	67.0	1.18	
Killbuck	92	32	64.3	1.01	
Lancaster	94	34	67.0	0.75	
Lima	91	37	65.7	2.25	
McConnelsville	93	34	66.4	0.23	
Manara	92	35	65.5	1.10	
Mansfield				2.25	
Marietta	87	39	67.0	1.34	
Marion	97	35	66.9	3.00	
Medina	92	35	65.3	1.34	
Milfordton	95	32	65.0	2.58	
Milligan	94	26	64.6	0.33	
Millport	88	30	62.2	0.40	
Montpelier	88	37	62.5	1.41	
Napoleon	91	38	65.1	2.39	
New Alexandria	92	36	66.4	0.65	
New Berlin	90	33	63.8	0.92	
New Bremen	94	34	66.2	1.47	
New Richmond	94	39	70.0	1.78	
New Waterford	94	32	63.4	0.32	
North Lewisburg	92	35	66.0	1.15	
North Royalton	88	38	64.3	2.40	
Norwalk	94	36	65.2	1.82	
Ohio State University	93	35	64.6	1.39	
Orangeville	88	28	63.3	1.89	
Ottawa	94	36	65.8	2.76	
Pataskala	95	33	65.8	1.04	
Philo	95	37	68.7	0.43	
Plattsburg	93	35	66.4	1.47	
Pomeroy	93	34	65.4	0.75	
Portsmouth *a*				0.43	
Portsmouth *b*	94	35	68.8	0.55	
Pulse	94	37	67.4	1.98	
Richwood	94	34	64.8	2.55	
Rittman	94	33	65.2	1.83	
Rockyridge	94	37	66.1	3.14	
Shenandoah	90	35	63.6	1.48	
Sidney	93	35	65.6	1.58	
Somerset	94	38	67.8	0.80	
Springfield				1.39	
Strongsville				1.88	
Thurman	93	34	68.8	2.06	
Tiffin	89	39	64.8	1.94	
Upper Sandusky	96	37	66.6		
Urbana	87	37	63.1	1.03	
Vanwert	96	29	67.1	2.35	
Vickery	93	36	66.7	1.58	
Walnut				0.98	
Warren	93	32	63.6	0.86	
Warsaw	98	30	64.6	1.34	
Wauseon	93	35	64.7	2.48	
Waverly	95	33	68.2	1.22	
Waynesville	94	35	66.6	0.73	
Wellington	91[b]	36[c]	65.0[b]	1.98	
Willoughby				2.01	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Wilson	95	32	67.0	1.97	
Wooster	89	32	64.4	2.07	
Zanesville				0.28	
Oklahoma.					
Beaver	96	37	69.6	0.34	
Binger	97	39	70.0	1.94	
Chandler	95	41	70.4	3.06	
Cleo	94	34	67.6	1.57	
Cloud Chief	98	40	72.0	1.49	
Eldorado	100	41	73.9	1.13	
Fort Reno	99	42	70.6	3.00	
Fort Sill	98	40	70.6	2.20	
Grand	99	40	69.1	1.50	
Guthrie	96	44	70.8	3.05	
Hennessey	101	38	75.1	0.96	
Hobart	99	40	72.2	1.68	
Jefferson	97	36	71.5	2.52	
Jenkins	99	39	71.7	1.44	
Kenton	95	34	67.8	0.04	
Kingfisher	98	44	72.8	1.79	
McComb	96	40	71.3	2.24	
Mangum	104	45	74.1	1.75	
Meeker	98	38	72.7	2.58	
Newkirk	102	32	69.0	2.34	
Pawhuska	95	38	68.5	0.90	
Perry	98	38	70.9	3.13	
Sac and Fox Agency	97			2.75	
Shawnee	95	43	71.2	2.40	
Stillwater	97	41	69.5	3.01	
Taloga	104	37	72.8	1.01	
Temple	99	39	74.2	1.08	
Watonga	94	39	67.4	2.05	
Waukomis	95	40	72.4	1.25	
Weatherford	99	39	71.4	0.79	
Woodward	98	37	70.0	0.65	
Oregon.					
Albany				1.12	
Alpha	89	34	58.1	2.09	
Arlington [f]	88	43	65.0	0.30	
Ashland	92	34	60.2	0.46	
Astoria	80	45	59.2	1.81	
Aurora (near)	85	35	58.2	1.07	
Bay City	75	40	55.3	4.27	
Bend	83	19	50.3	0.02	
Beulah	95	23	54.8	T.	
Blackbutte	90	35	58.5	1.80	
Blalock	91	40	66.0	0.20	
Bullrun				4.95	
Cascade Locks	84	40	60.8	4.50	
Coquille				0.69	
Corvallis	88	32	60.3	0.37	
Coyote	94	35	62.2	0.40	
Dayville	88	31	57.2	0.42	
Detroit				2.20	
Doraville	81	38	56.9	2.50	
Drain	94	35	60.5	1.13	
Ella				0.50	
Eugene	80	37	59.6	1.43	
Fairview	88	39	60.7	1.11	
Falls City	84	33	57.3	0.51	
Forestgrove	89	30	58.8	0.34	
Gardiner	89	42	61.8	1.73	
Glenora	87	35	54.7	4.14	
Gold Beach	83	40	59.2	0.94	
Government Camp	76	31	48.8	6.35	
Grants Pass	96	31	61.2	0.19	
Grass Valley	84	24	53.8	0.65	
Hood River (near)	87	33	58.4	0.89	
Huntington	93	30	64.2	0.29	
Jacksonville	95	36	62.3	0.55	
Joseph	86	25	50.6	1.64	
Kerby	96	31	60.2	0.39	
Lagrande	88	25	54.8	1.82	
Lakeview	90	25	55.4	0.06	
Langlois	78	36	56.6	0.84	
Lonerock	82	28	55.2	1.33	
McKenzie Bridge	96	29	57.6	3.02	
McMinnville	87	30	59.1	0.59	
Monroe	85	37	60.3	0.68	
Mount Angel	86	35	59.5	1.11	
Nehalem				8.67	
Newport	73	42	56.0	1.85	
Pine	90	23	53.0	0.90	
Prineville	84	22	53.7	0.09	
Salem	85	35	61.5	0.23	
Sparta	86	31	55.9	0.93	
Stafford	88	37	60.5	1.04	
The Dalles	85	35	61.7	0.15	
Toledo	85	38	58.4	2.21	
Umatilla	90	35	64.0	0.45	
Vale	94	21	57.4	0.21	
Wallowa	90	23	52.0	1.14	
Wamic	86	27	56.1	0.35	
Warm Spring	88	28	58.9	0.04	
Weston	85	32	56.0	1.73	
Williams	97	29	58.9	0.12	
Pennsylvania.					
Altoona	87	30	61.7	1.93	
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Athens	89	32	62.0	1.71	
Beaver Dam				1.35	
Bellefonte	87	33	64.3	2.63	
Brookville				2.44	
Browers				2.96	
Butler	86[c]	33[c]	63.6[c]	1.28	
California	94	36	67.4	2.72	
Cassandra	82	28	59.4	1.85	
Centerhall	85	34	63.7	3.19	
Clarion				1.48	
Coatesville	90	36	66.3	1.90	
Coudersport	83	29	58.7	1.92	
Confluence				1.64	
Davis Island Dam				1.10	
Derry	93	33	64.7	1.63	
Doylestown				3.33	
Dushore	82	27	58.0	1.52	
East Bloomsburg				1.90	
East Mauch Chunk	89	32	63.7	1.90	
Easton	84	36	63.8	1.43	
Ellwood Junction				1.06	
Emporium	83	34	59.8	1.56	
Ephrata	92	35	65.7	2.09	
Everett	89	31	63.2	2.50	
Forks of Neshaminy				3.55	
Freeport	94	33	66.9	1.08	
Gettysburg	90	39	66.3	2.26	
Girardville				3.05	
Gordon	85	30	60.8	2.52	
Grampian	86	26	60.6	1.98	
Greensboro				1.36	
Greenville	89	29	62.3	1.48	
Hamburg	88	35	64.5	1.45	
Hamlinton	83	33	58.2	1.61	
Hawthorn	88	30	63.4	2.68	
Herrs Island Dam				1.10	
Huntingdon *a*				2.99	
Huntingdon *b*	87	33	63.0	3.02	
Indiana	88	32	63.2	1.17	
Irwin	90	31	65.4	1.60	
Johnstown	92	32	65.0	1.83	
Keating				2.40	
Kennett Square	84	37	65.4	2.83	
Lansdale				1.63	
Lawrenceville	90	30	61.8	1.99	
Lebanon	88	35	65.1	2.55	
Leroy	84	33	60.3	1.57	
Lewisburg	89	34	64.2	2.21	
Lockhaven *a*	91	36	65.2	3.20	
Lockhaven *b*				2.46	
Lock No. 4				2.83	
Lycippus	89	36	65.6	1.53	
Marion	86	35	63.8	1.52	
Mifflin				2.44	
Mifflintown	88	33	63.5	2.36	
Milford	89	31	61.8	1.25	
Montrose	84	34	60.6	2.27	
New Germantown	87	35	63.6	3.42	
Oil City				2.04	
Ottsville				2.47	
Parker				2.62	
Philadelphia	87	45	67.8	3.49	
Pocono Lake	78	32	57.2	2.97	
Point Pleasant				2.68	
Pottsville				2.76	
Quakertown	89	32	64.8	1.34	
Reading	88	35	65.5	2.84	
Renova *a*	86	37	62.4	2.01	
Renovo *b*				2.10	
Saegerstown	88	28	62.0	1.48	
St. Marys	84	28	57.9		
Saltsburg				3.88	
Seisholtzville				2.05	
Selinsgrove	89	37	65.4	3.01	
Shawmont				2.99	
Smethport	85	28	59.4	3.40	
Smiths Corners				2.93	
Somerset	89	29	61.4	1.30	
South Eaton	85	35	62.2	1.93	
Springmount				1.66	
State College	84	35	61.4	2.61	
Swarthmore	86	36	66.2	2.72	
Towanda	87	31	61.4	1.24	
Uniontown	90	36	65.6	1.21	
Warren	85	34	61.5	2.32	
Wellsboro	90	32	61.4	1.10	
Westchester	87	41	66.4	2.78	
West Newton				1.74	
Wilkesbarre	86	32	61.2	2.16	
Williamsport	85	37	63.3	1.43	
Windber				2.20	
York	89	41	66.4	2.72	
Rhode Island.					
Bristol	79[e]	45[e]	62.8[e]	0.84	
Kingston	88	34	61.8	0.75	
Pawtucket	90	37	64.2	0.91	
Providence *a*	90	42	65.4	1.00	
Providence *c*	89	40	63.2	1.14	
South Carolina.	°	°	°	*Ins.*	*Ins.*
Anderson	100	49	73.9	0.90	
Batesburg	95	45	71.4	4.26	
Beaufort	94	59	75.8	6.26	
Bennettsville	94	45	75.0	1.70	
Blackville	97	50	74.2	3.97	
Bowman	94	52	73.4	5.04	
Calhoun Falls				2.19	
Camden				4.21	
Cheraw *a*	90	45	70.8	5.07	
Cheraw *b*				5.12	
Clarks Hill	98	50	73.9	3.28	
Clemson College	100	44	72.6	1.88	
Conway	93	49	72.6	5.76	
Darlington	95	44	73.2	1.93	
Duewest	93	50	72.4	0.60	
Edisto				3.47	
Effingham				3.13	
Florence	94	47	72.2	4.30	
Gaffney	100	42	72.2	0.85	
Georgetown	92	54	72.4	2.50	
Gillisonville	93	54	74.4	9.39	
Greenville	90	44	68.3	2.16	
Greenwood	96	48	71.8	1.44	
Heath Springs	96	43	72.4	2.81	
Kingstree *a*	90	54	73.4	3.42	
Kingstree *b*				3.46	
Liberty	95	46	71.2	2.51	
Little Mountain	96	49	72.4	1.79	
Longshore	97	46	73.2	1.10	
Lugoff	93	52	72.6	4.35	
St. Georges	91	55	73.6	2.96	
St. Matthews	88	55	72.8	3.00	
St. Stephens				4.76	
Saluda	98	43	72.8	2.19	
Santuck	95	42	71.2	4.86	
Seivern	96	41	72.1	2.07	
Smiths Mills				3.04	
Society Hill	87	49	71.8	1.77	
Spartanburg	94	45	71.0	2.25	
Statesburg	90	51	73.0	4.79	
Summerville	89	55	72.3	4.75	
Sumter	96	45	72.8	4.82	
Trenton	96	51	72.6	3.30	
Trial	89	49	71.0	3.17	
Walhalla	94	44	70.3	5.69	
Walterboro	91	55	73.6	7.42	
Winnsboro	92	50	73.2	2.03	
Winthrop College	93	46	71.5	3.51	
Yemassee	93	57	74.0	9.43	
Yorkville	92	49	72.1	2.97	
South Dakota.					
Aberdeen	88	28	58.2	3.46	0.6
Academy	90	27	59.5	1.61	T.
Alexandria	91	26	59.2	4.25	
Armour	96	26	60.0	2.68	
Ashcroft	88	26	55.4	1.54	5.0
Bowdle	83	24	53.4	2.42	5.0
Brookings	88	25	56.6	2.73	
Canton	88	28	59.8	1.47	
Cavite	94	25	58.6		
Centerville				1.76	
Chamberlain	92	30	61.1	2.26	
Clark	86	24	55.4	2.92	T.
Clear Lake	86	30	56.6	3.25	
Doland	92	23	58.2	4.29	T.
Elkpoint	90	30	61.8	2.33	
Fairfax				0.48	
Farmingdale				2.29	T.
Faulkton	83	26	55.2	2.31	
Flandreau	86	28	57.0	4.90	
Forestburg	94	29	59.0	2.81	
Fort Meade	90	30	56.4		
Gannvalley	92	25	59.4	1.72	
Gettysburg	85	26	54.8	5.07	6.0
Greenwood	95	27	62.0	2.04	
Highmore				1.46	1.0
Hotch City	93	24	58.6	1.66	T.
Howard	89	28	59.0	3.95	
Howell	89	24	56.0	1.94	T.
Ipswich	83	24	54.5	5.02	3.0
Kidder	93	26	54.4	3.86	T.
Kimball	85	30	58.2	1.36	
Leola	80	25	53.8	4.75	3.0
Leslie	86	24	55.4	1.57	
Marion	90[e]	26[e]	58.4[e]	2.88	
Mellette	85	27	57.2	2.31	
Menno	92	27	59.4	3.33	
Millbank	88	30	60.6	5.04	
Mitchell	92	27	60.5	3.81	
Oelrichs	93	28	52.9	1.75	4.5
Pedro	88	27	57.2	1.81	
Pine Ridge	90	28	56.6	1.59	
Plankinton	89	25	58.0	2.17	
Ramsey	89	24	58.0	3.12	
Redfield	87	24	55.4	2.02	
Rosebud [m]	101	25	59.4		1.5
St. Lawrence	94[f]	26[g]	55.2[g]		
Silver City				2.13	12.

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
South Dakota—Cont'd.					
Sioux Falls	88	28	58.8	1.96	
Sisseton Agency	81	28	54.2	6.19	
Spearfish	82	29	53.9	3.88	11.0
Stephan*	95	29	57.0	1.33	T.
Tyndall	94	25	60.6	2.36	
Vermilion	90	32	62.5	2.40	
Watertown	84	25	54.8	4.52	
Wentworth	88	28	57.0	3.19	
Wolsey	.....	.....	.....	2.04	
Tennessee.					
Andersonville	94	33	67.3	0.10	
Arlington	96	37	69.1	0.55	
Ashwood	98	35	69.8	0.50	
Benton	95	37	69.5	0.77	
Bluff City	.....	.....	.....	0.31	
Bolivar	95	39	69.4	0.45	
Bristol	91	41[j]	67.8[e]	0.55	
Brownsville	95	40	68.6	2.00	
Byrdstown	93	37	68.6	0.68	
Carthage	98	38	71.6	0.41	
Charleston	.....	.....	.....	0.12	
Clarksville	94	39	71.0	0.24	
Clinton	.....	.....	.....	0.18	
Covington	93	40	70.0	0.66	
Decatur	95	37	69.2	0.18	
Dickson	94	36	69.2	T.	
Dyersburg	96	42	71.6	0.53	
Elizabethton	92	38	69.7	0.30	
Erasmus	91	33	64.0	0.22	
Florence	93	36	70.0	0.30	
Franklin	93	38	69.7	0.15	
Grace *[1]	96	40	69.7	0.10	
Greeneville	.....	.....	.....	0.67	
Halls Hill	.....	.....	.....	0.75	
Harriman	91	37	68.4	T.	
Hohenwald	97	29	67.8	0.58	
Iron City	96	35	69.0	1.74	
Isabella	91	40	68.6	0.38	
Jackson	98	34	68.6	0.74	
Johnsonville	99	35	70.2	0.25	
Jonesboro	91	37	67.2	0.10	
Kenton	99	36	70.4	0.75	
Kingston	.....	.....	.....	T.	
Leadvale	.....	.....	.....	T.	
Lewisburg	97	36	70.5	1.17	
Liberty	98	39	69.6	0.24	
Lynnville	94	40	69.9	1.10	
McKenzie	96	42	73.6	0.25	
McMinnville	93	36	69.0	0.46	
Maryville	95	40	71.2	0.15	
Milan	95	37	69.0	0.63	
Newport	89	40	69.2	T.	
Oakhill	92	.....	.....	0.10	
Palmetto	96	39	70.6	1.59	
Pope	100	34	70.4	0.50	
Rogersville	94	38	69.6	0.18	
Rugby	95	29	65.4	0.23	
Savannah	97	39	71.6	0.48	
Sewanee	92	42	69.2	0.25	
Silverlake	81	34	61.8	0.98	
Springdale	96	32	67.0	0.05	
Springville	98	33	70.0	0.58	
Tazewell	.....	.....	.....	T.	
Tellico Plains	94	37	69.4	0.20	
Trenton	98	35	70.2	0.55	
Tullahoma	97	36	69.2	0.95	
Waynesboro	96	36	69.6	0.60	
Wildersville	90	39	69.2	0.30	
Yukon	95	43	71.6	0.89	
Texas.					
Albany	94	46	73.2	4.36	
Alvin	94	52	78.0	1.09	
Arthur	.....	.....	.....	3.59	
Austin *a*	93	45	76.0	T.	
Austin *b* *[2]	94	45	75.9	.....	
Ballinger	94	42	72.8	8.02	
Beeville	99	56	80.2	0.68	
Bigspring	101	41	74.2	3.16	
Blanco	95	41	73.8	2.18	
Boerne *[1]	93	47	73.8	1.62	
Bonham	92	44	72.3	3.79	
Booth	.....	.....	.....	0.78	
Bowie	103	41	75.3	3.95	
Brenham	94	53	76.8	1.88	
Brighton	90	53	79.9	0.88	
Brownwood	98	40	74.2	7.20	
Burnet	95	42	75.0	0.70	
Camp Eagle Pass	102	50	78.3	4.26	
Childress	102	44	74.2	0.87	
Coleman	93	45	74.5	8.18	
College Station	102	49	78.0	0.37	
Colorado	99	40	73.6	2.60	
Columbia	92	50	76.0	1.06	
Comanche	95	40	74.0	7.05	
Corsicana	101	45	76.2	3.46	
Cotulla	94	52	77.1	2.02	
Cuero	94	49	77.4	1.65	
Dallas	95	44	74.6	3.37	
Texas—Cont'd.					
Danevang	94	46	77.2	T.	
Dialville	92	45	74.6	0.50	
Dublin	93	43	72.9	4.70	
Duval	92	51	76.3	0.49	
Estelle	97	43	75.6	2.26	
Fort Brown	94	64	80.6	2.63	
Fort Clark	95	47	72.7	7.93	
Fort Davis	90	40	68.8	1.22	
Fort McIntosh	99	56	80.8	8.02	
Fort Ringgold	97	60	80.6	2.60	
Fort Stockton	.....	.....	.....	1.38	
Fredericksburg	91[e]	43[e]	73.6[e]	1.59	
Gainesville	95[e]	40[e]	74.2[e]	10.54	
Gatesville	99	42	76.5	1.90	
Grapevine	97	44	75.9	3.97	
Greenville	97	43	74.6	3.78	
Hale Center	96	42	70.2	0.80	
Hallettsville	95	47	77.5	0.47	
Haskell	102	40	75.3	1.35	
Hearne	101	50[e]	76.6	0.94	
Henrietta	100	41	74.8	2.28	
Hewitt	.....	.....	.....	0.97	
Hillsboro	94	40	75.2	4.73	
Hondo	90	54	76.2	7.17	
Houston	95	54	77.8	2.00	
Huntsville	93	48	74.8	1.40	
Ira	99	43	72.8	2.72	
Jasper	94	46	76.0	T.	
Junction	.....	.....	.....	3.50	
Kaufman	96	45	76.8	5.60	
Kent	101	40	73.4	0.82	
Kerrville	91	36	71.0	3.64	
Kopperl	.....	.....	.....	6.40	
Lampasas	95	42	74.4	0.93	
Lapara	.....	.....	.....	0.60	
Llano	96	50	74.2	2.45	
Logansport	.....	.....	.....	0.30	
Longview	95	44	75.1	1.14	
Luling	94	46	76.2	0.15	
Mann	93	42	74.3	3.52	
Marlin	94	45	76.1	0.48	
Menardville	97	38	73.4	3.63	
Mount Blanco	98	40	70.8	1.02	
Nacogdoches	95	45	72.8	0.15	
New Braunfels	91	46	76.6	0.55	
Panter	.....	.....	.....	4.15	
Pearsall	96	52	79.0	1.77	
Port Lavaca	92	59	79.0	1.07	
Rhineland	100	42	72.6	2.47	
Rockisland	94	48	76.8	T.	
Rockland	.....	.....	.....	0.49	
Rockport	88	58	77.8	1.22	
Runge	98[e]	51[e]	79.4[e]	0.12	
Sabinal	.....	.....	.....	5.07	
San Saba	97	41	75.2	2.83	
Santa Gertrudes Ranch	.....	.....	.....	0.70	
Sherman	92	46	73.6	3.22	
Sonora	95	41	74.2	3.24	
Sugarland	93	50	76.6	0.71	
Sulphur Springs	92	43	74.0	3.29	
Temple *a*	91	46	74.5	0.45	
Temple *b*	92	45	74.1	0.37	
Trinity	96	44	75.8	2.48	
Tulia [f]	91	39	64.2	4.25	
Tyler	94	45	74.8	1.33	
Victoria [g]	94	51	77.2	0.54	
Waco	95	47	77.0	1.68	
Waxahachie	96	41	74.8	3.87	
Weatherford	95	42	75.0	2.35	
Weimar	97	52	78.0	0.99	
Wichita Falls	.....	.....	.....	1.02	
Utah.					
Aneth	96	32	64.2	0.93	
Blackrock	88	25	57.4	0.92	
Bluecreek	78	35	56.6	0.10	
Callao	95	26	59.6	0.31	
Castledale	94	19	57.8	0.49	
Corinne	98	28	60.0	0.47	
Deseret	96	22	59.0	0.67	
Emery	78	30	52.6	1.52	
Escalante	89	31	61.1	1.10	
Farmington	90	29	55.3	0.88	
Fillmore	102	35	64.6	1.00	
Fort Duchesne	94	27	57.0	1.20	
Frisco	90	33	61.3	0.82	
Garrison	92	25	61.2	0.38	
Giles	98	29	61.2	1.17	
Government Creek	92	29	60.2	0.07	
Green River	103	30	64.2	0.12	
Grover	84	26	57.2	0.55	T.
Heber	92	18	53.4	1.17	T.
Henefer	90	20	52.8	0.93	
Hite	101	42	69.8	0.32	
Huntsville	.....	.....	.....	1.88	
Ibapah	93	19	55.2	0.21	
Kanab	91	41	64.6	0.75	
Kelton	92	25	56.9	0.00	
Levan	89	28	57.8	0.92	
Utah—Cont'd.					
Loa	90	20	54.8	0.35	
Logan	90	32	58.2	0.90	
Lund*	92	25	60.6	0.50	
Manti	92	26	58.2	0.98	
Marysvale	89	25	56.7	1.04	
Meadowville	87	26	51.8	1.20	T.
Millville	.....	.....	.....	0.87	
Moab	98	33	64.4	1.27	
Monticello	89	29	57.6	1.17	
Morgan	91	25	54.0	0.98	
Mount Nebo	95	29	60.9	0.26	
Mount Pleasant	95	27	58.9	1.57	
Ogden	88	35	58.8	0.94	
Park City	91	24	54.4	1.17	4.0
Parowan	90	26	57.1	1.00	2.0
Pinto	85	23	54.4	1.37	0.3
Plateau	91	20	53.6	1.65	7.0
Promontory *[1]	93	38	65.6	0.00	
Provo	95	27	58.8	0.72	
Ranch	82	24	55.8	3.02	
Richfield	90	27	55.8	1.00	
St. George	101	33	66.7	1.92	
Salt Air	91	38	62.4	0.30	
Scipio	93	19	58.9	0.98	
Snowville	93	20	54.2	0.06	
Terrace	95	24	59.3	0.00	
Thistle	100	34	61.6	0.66	
Tooele	96	33	62.0	0.79	
Tropic	86	27	58.0	1.98	
Vernal	94	29	57.9	1.50	
Woodruff	90	16	49.1	1.15	
Vermont.					
Burlington	84	41	64.1	0.80	
Cavendish	89	30	59.7	1.20	
Chelsea	81	34	57.2	1.44	
Cornwall	89[g]	35[g]	62.7[g]	0.90	
Derby	86	34	59.0	0.93	
Enosburg Falls	86	27	57.2	0.45	
Jacksonville	73	30	53.4	1.44	
Manchester	83	31	58.8	1.57	
Morrisville	92	26	59.2	0.85	
Norwich	88	20	58.1	1.55	
St. Johnsbury	91	26	60.6	1.08	
Wells	82	34	59.3	2.08	
Woodstock	87	27	59.8	0.73	
Virginia.					
Ashland	89	40	68.2	2.34	
Barboursville	87	40	67.4	1.10	
Bedford	92	40	70.1	2.97	
Bigstone Gap	91	36	65.6	2.00	
Blacksburg	86	32	62.0	4.96	
Boykins	94	58	75.7	1.98	
Buckingham	92	37	67.0	1.76	
Burkes Garden	80	25	57.8	1.42	
Callaville	87	42	66.7	1.17	
Charlottesville	89	43	68.0	1.93	
Clarksville	.....	.....	.....	2.20	
Columbia	92	23	64.6	0.90	
Dale Enterprise	87	34	64.0	2.86	
Danville	.....	.....	.....	1.19	
Elk Knob	88	40	68.4	0.27	
Farmville	91	40	67.6	2.10	
Fredericksburg	88	36	67.4	2.84	
Hampton	89	47	71.2	1.50	
Hot Springs	80	33	60.6	4.75	
La Crosse	90	46	69.0	1.32	
Lexington	90	37	66.8	3.40	
Lincoln	90	35	65.4	1.64	
Manassas	86	41	66.2	1.50	
Marion	89[d]	34[d]	65.2[d]	1.00	
McDowell	89	34	63.7	1.11	
Mendota	.....	.....	.....	1.79	
Newport News	95	50	74.0	0.30	
Petersburg	89	40	69.4	3.12	
Quantico	92	36	68.2	.....	
Radford	.....	.....	.....	1.30	
Riverton	.....	.....	.....	1.14	
Roanoke	81[e]	38[e]	61.8[e]	4.15	
Rockymount	80	38	62.0	3.52	
Saxe	90	37	67.6	2.93	
Shenandoah	.....	.....	.....	2.24	
Speers Ferry	.....	.....	.....	1.14	
Spottsville	90	40	69.0	1.67	
Stanardsville	90	33	67.4	1.75	
Staunton	89	37	66.2	2.30	
Stephens City	92	33	65.6	2.56	
Warsaw	90	40	68.8	1.58	
Wilkerson	87	41	68.6	3.21	
Williamsburg	90	44	68.3	2.65	
Woodstock	93	34	67.0	2.45	
Wytheville	88	34	64.2	1.04	
Washington.					
Aberdeen	83	39	57.4	5.36	
Anacortes	.....	.....	.....	3.36	
Ashford	.....	.....	.....	4.14	
Blaine	74	36	54.0	7.14	
Bremerton	83	35	59.4	1.99	
Brinnon	76	39	56.7	2.91	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Washington—Cont'd.					
Cadonia	76	29	51.4	1.23	
Centralia	84	37	57.7	3.66	
Cheney				0.81	
Clearbrook	77	35	55.6	8.00	
Clearwater	77	39	56.4	10.46	
Cle Elum	81	25	52.2	2.17	
Colfax	90	25	55.8	1.36	
Colville	80	24	52.6	1.11	
Conconully	75	27	52.8	1.17	
Connell				0.40	
Coupeville	73	38	55.0	2.18	
Crescent	81	23	53.2	0.70	
Danville	79	28	52.3	2.18	
Dayton	83	38	59.1	1.48	
East Sound	72	32	52.8	6.27	
Ellensburg	80	26	54.2	0.69	
Grandmound	82	34	56.9	3.91	
Granite Falls				8.35	
Hooper	95	28	60.3	0.45	
Horseheaven				0.88	
Ilwaco	75	42	57.6	4.95	
Lacenter				2.79	
Lakeside	80	37	60.0	0.43	
Lind	86	35	58.9	0.22	
Loomis	79	35	57.7	1.25	
Mottinger Ranch	91	37	64.6	0.62	
Mount Pleasant	80	40	59.2	3.76	
Moxee	84	27	57.2	0.50	
Northport	78	26	51.4	3.35	
Odessa	88	27	59.0	0.13	
Olga	70	38	54.8	4.27	
Olympia	85	38	58.3	3.64	
Pinehill	86	32	60.2	0.60	
Pomeroy	93	32	59.0	2.29	
Port Townsend	71	40	55.8	1.72	
Pullman	88	30	55.6	1.93	
Rattlesnake	77	33	56.1	1.59	
Republic	79	23	49.5	1.10	
Ritzville (near)				0.43	
Rosalia	84	22	53.4	0.89	
Sedro-Woolley	80	37	56.4	8.33	
Silvana	77	33	54.6	3.60	
Snohomish	77	34	57.0	3.67	
Snoqualmie	81	40	57.4	7.48	
Southbend	85	40	56.2	5.51	
South Ellensburg	80	26	55.9	0.65	
Sprague				0.14	
Sunnyside	81	32	58.8	0.60	
Trinidad	88	40	64.6	0.45	
Twisp	82	28	56.3	1.08	
Union	84	37	56.4	2.77	
Usk	79	25	50.4	1.51	
Vancouver	86	35	60.0	1.58	
Vashon	74	41	57.0	3.52	
Waterville	78	32	54.4	0.65	
Wenatchee (near)	80	34	57.0	1.44	
Whatcom	82	33	55.6	5.38	
Wilbur	94	20	53.4	0.71	
Zindel	93	45	65.0	0.67	
West Virginia.					
Bayard	85	27	58.7	1.71	
Beverly	86	29	60.6	1.15	
Bluefield	88	33	64.8	0.10	
Burlington	86	29	62.6	1.88	
Cairo	95	32	68.0	2.45	
Central	92[f]	32[f]	64.8[f]	2.05[e]	
Chapel	87	36	62.4	1.21	
Charleston				0.57	
Creston	92	34	66.4	1.08	
Cuba	92	32	66.2	0.75	
Dayton	91	31	62.4	1.65	
Elkhorn	87	36	65.5	0.46	
Fairmont				1.34	
Glenville	92	35	65.3	1.10	
Grafton	92	33	65.4	1.49	
Green Sulphur Springs	90	30	64.4	0.59	
Harpers Ferry				2.23	
Hinton *a*				0.42	
Hinton *b*	92	38	65.6	0.42	
Huntington	92	38	67.2	0.28	
Josiah	91	37	67.2	1.31	
Leonard	82	35	62.4	0.37	
Lewisburg	86	33	63.1	2.43	
Lillydale	92	33	66.6	0.99	
Logan	89	38	68.2	0.93	
Marlinton	83	32	61.9	1.83	
Martinsburg	89	35	64.2	2.17	
Morgantown	92	37	66.7	1.21	
Moscow	89	35	65.4	1.10	
Moundsville	91	36	66.7	0.40	
New Martinsville	96	37	69.0	1.05	
Nuttallburg	91	35	66.4	1.30	
Oldfields	97	27	62.4	2.56	
Parsons	86	32	59.8	2.46	
Philippi	94	31	63.4	2.29	
Pickens	86	34	62.2	2.78	
Point Pleasant	94	37	70.3	2.44	
Powellton	96	28	61.8	1.34	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
West Virginia—Cont'd.					
Princeton	85	34	62.4	1.25	
Romney[h]	89	31	62.5	0.65	
Rowlesburg				1.54	
Ryan	95	30	65.8	0.24	
Southside	90	40	69.2	1.05	
Terra Alta	86	29	61.2	0.64	
Travellers Repose	85	25	58.4	2.09	
Uppertract	90	31	64.8	2.52	
Valley Fork	93[c]	34[d]	72.0[d]	0.47	
Wellsburg	85	36	64.2	1.13	
Weston				1.70	
Wheeling *a*				0.57	
Wheeling *b*	98	43	71.2	0.57	
Williamson	92	39	67.7	0.67	
Wisconsin.					
Amherst	81	25	56.1	3.85	
Appleton	80	27	59.9	3.47	
Appleton Marsh	82	24	58.0	5.09	
Ashland				5.22	
Barron	82[g]	22[e]	60.3[f]	5.95	
Beloit	81	38	61.8	4.91	
Brodhead	86	32	62.0	3.97	
Butternut	85	20	54.0	6.98	
Chilton	84	33	59.2	4.10	
Chippewa Falls				5.14	
Citypoint	83[g]	31[h]	62.0[h]	2.49	
Darlington	85	32	61.6	3.81	
Delavan	84	34	61.0	5.33	
Dodgeville	85	31	59.8	4.00	
Downing	81	24	55.7	7.37	
Easton	83	25	58.9	3.08	
Eau Claire	80	30	59.5	9.12	
Florence	90	28	54.7	7.10	
Fond du Lac	82	30	60.2	3.94	
Grand Rapids	81	26	59.0	4.47	
Grand River Locks				5.32	
Grantsburg	83	25	55.9	10.02	
Hancock	81	28	58.3	2.46	
Harvey	82	33	60.2	4.93	
Hayward	83	21	54.8	6.35	
Hillsboro	84	29	58.8	3.56	
Koepenick	85	20	56.0	7.80	
Lancaster	83	30	59.7	3.43	
Madison	81	37	60.5	3.51	
Manitowoc	83	33	58.5	3.39	
Meadow Valley	82	25	58.2	4.48	
Medford	83	25	57.6	9.50	
Menasha				3.07	
Minocqua[e]	80	30	59.6	7.37	
Neillsville	82	24	57.4	8.32	
New London	84	27	58.8	3.05	
North Crandon	77	20	52.6	8.11	
Oconto	84	31	58.9	5.40	
Osceola	84	26	55.6	8.76	
Pine River	83	27	58.5	2.53	
Portage	82	34	60.9	2.74	
Port Washington	84	30	60.1	2.82	
Prairie du Chien *a*	87	32	61.4	3.48	
Prairie du Chien *b*				3.30	
Prentice	81	20	54.9	7.12	
Racine	85	36	63.5	4.20	
Sheboygan	86	34	61.5	2.66	
Stanley	83	25	58.2	11.04	
Stevens Point	83	24	58.4	3.78	
Tomahawk	80[e]	20[e]	54.0[e]	6.96	
Valley Junction				4.08	
Viroqua	79	32	57.8	3.82	
Watertown	82	30	56.9	3.77	
Waukesha	82	36	60.6	5.04	
Waupaca	83	26	58.1	3.66	
Wausau	80	25	57.1	5.78	
Whitehall	81	28	58.1	11.48	
Wyoming.					
Afton	85	21	49.4	0.99	
Alcova	90	23	53.9	1.59	4.5
Basin	93[i]		61.5[h]	0.26	
Bedford	83	16	47.9	0.91	1.9
Border	89	16	47.2	1.28	
Buffalo	84	24	52.2	2.55	6.8
Chugwater	88	7	53.8	1.90	12.0
Daniel	75	18	42.4	1.21	
Evanston	83	18	49.5	0.76	2.0
Fort Laramie	98	20	56.4	1.57	7.0
Fort Washakie	90	26	53.2	2.11	3.0
Fort Yellowstone	82	18	49.2	0.60	5.0
Fourbear	79	20	48.0	2.03	17.5
Griggs	93	26	53.6	2.29	19.9
Hyattville	92	28	56.0		
Iron Mountain	85	12	52.2	2.14	14.0
Laramie	82	18	51.2	2.39	14.5
Leo	84	13	49.8	1.28	2.5
Lolabama Ranch	80	13	44.3	1.41	5.0
Lusk	87	21	52.1	1.15	2.0
Marquette	84	25	51.6	1.09	T.
Moore[e]	89	20	53.2	3.06	10.0
Moorcroft	90	26	52.8	2.20	4.0
Pinebluff	93	13	57.6	1.13	5.0
Phillips	92	15	55.0	0.94	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Wyoming—Cont'd.					
Rawlins	90	18	51.3	1.56	
Redbank	90	27	54.6	1.53	
South Pass	86	12	45.5	1.20	11.0
Tensleep	90	28	55.7	0.50	
Thayne	85	16	46.8	0.80	0.5
Thermopolis	88	30	53.5	0.35	
Porto Rico.					
Adjuntas	91	59	75.5	8.24	
Aguirre	95	70	82.3	2.42	
Arecibo	90	68	78.8	5.73	
Barros	89	61	74.6	5.98	
Bayamon	94	60	77.0	3.30	
Caguas	92	67	79.6	3.67	
Canovanas	95	71	80.8	5.57	
Cayey	91	60	75.1	6.79	
Cidra	85	58	71.4	9.05	
Coamo	96	60	78.1	1.15	
Fajardo	93	71	81.8	3.42	
Guanica	96	67	80.0	2.68	
Hacienda Coloso	92	66	79.5	5.25	
Hacienda Josefa				4.83	
Hacienda Perla	91	65	79.6	6.41	
Humacao	89	77	83.2	8.22	
Isabela	89	67	78.4	5.78	
La Carmelita	88	66[e]	76.4[e]	12.35	
La Isolina	92	65	77.4	12.60	
Lares	91	60	76.0	9.92	
Las Marias	93	67	79.4	11.58	
Manati	95	67	80.2	6.60	
Maunabo	94	67	80.4	6.83	
Mayaguez	94	65	79.8	7.77	
Morovis	93[e]	64	78.6[e]	13.10	
Ponce	92	69	80.6	2.88	
Rio Piedras				5.28	
San German	97	68	82.6	4.72	
San Salvador	89	64	75.7	11.46	
Santa Isabel	93	68	80.6	1.93	
Utuado	93	62	76.8	15.05	
Vieques	92	68	79.4	5.05	
Yauco	90	70	80.1	3.77	
Mexico.					
Ciudad P. Diaz	94	47	69.9	6.65	
Coatzacoalcos	90[k]	66	79.5[f]	29.06	
Durango	86	58	71.4	4.15	
Leon de Aldamas	81	53	67.2	3.38	
Vera Cruz	89	69	78.9	7.36	
New Brunswick.					
St. John	82	39	57.1	2.23	
Isthmus of Panama.					
Alhajuela	96	74	82.6	8.35	
Bohio				15.59	
Colon				11.61	
Gamboa				9.29	
La Boca	86	72	78.2	4.33	
West Indies.					
Columbia, Isle of Pines	92	69	80.5	10.40	

Late reports for August, 1903.

Stations.	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alaska.					
Copper Center	85	24	58.3	1.16	
Fort Liscum	68	34	50.4	6.44	
Kenai	75	29	53.8	3.78	
Skagway	78	39	56.9	2.08	
Tyoonok	76	39	56.8	5.69	
Wood Island	85	42	58.6	4.79	
California.					
San Miguel Island	71	50	59.6	0.00	
Colorado.					
Colorado Springs	92	42	65.8	2.57	
Florida.					
Myers	91	71	81.2	5.50	
Georgia.					
Alpharetta	95	55	77.9	3.67	
Milledgeville	96	68	81.6	6.94	
Illinois.					
Hallidayboro	99	54	79.6	3.58	
Michigan.					
Benzonia				2.75	
New Hampshire.					
Littleton	79	40	58.7	3.16	
New Mexico.					
Fort Bayard	94	51	71.4	3.87	
Fort Wingate	89	47	69.0	1.82	
Roswell				0.36	
New York.					
Plattsburg	84	40	60.9	4.40	
North Carolina.					
Hot Springs	90	61	74.8		
Waynesville	90	52	69.8	4.75	
North Dakota.					
Ellendale	92	42	65.8	6.32	
Wishik	105	38	66.2	4.99	
Tennessee.					
Clarksville	95	56	78.6	1.42	
Erasmus	91	46	71.6	5.87	

TABLE II.—*Climatological record of voluntary and other cooperating observers. Late reports for August*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Texas.					
Fort Stockton	......	......	......	0.30	
Menardville	103	55	80.5	1.73	
Utah.					
Meadowville	89	35	65.6	T.	
Vermont.					
Cornwall	80	42	62.4	3.45	
Virginia.					
Lexington	95	53	72.5	2.75	
Washington.					
Pullman	101[f]	40[g]	65.2[h]	1.16	
Porto Rico.					
Bayamon	90	60	76.8	5.00	
Ponce	93	68	80 9	6.92	

EXPLANATION OF SIGNS.

*Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

CORRECTIONS.

July, 1903, Alaska, Coal Harbor, values published are those for June, 1903. Mississippi, Tupelo, make precipitation 1.37 instead of 0.58.

August, 1903, Texas, Fort Clark, make precipitation 0.65 instead of 0.63.

TABLE III.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of September, 1903.*

Stations.	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	Hours.	Hours.	Hours.	°	Hours.
New England.						
Eastport, Me	14	25	4	28	s. 65 w.	26
Portland, Me	10	29	2	28	s. 54 w.	32
Concord, N. H. †	15	6	9	6	n. 18 e.	10
Northfield, Vt	11	39	12	4	s. 16 e.	29
Boston, Mass	16	20	4	35	s. 83 w.	31
Nantucket, Mass	21	23	11	20	s. 77 w.	9
Block Island, R. I	21	25	10	22	s. 72 w.	13
Narragansett, R. I.*	5	19	2	9	s. 27 w.	16
New Haven, Conn	28	19	4	21	n. 62 w.	19
Middle Atlantic States.						
Albany, N. Y	18	32	10	12	s. 8 w.	14
Binghamton, N. Y. †	9	6	13	9	n. 53 e.	5
New York, N. Y	20	21	12	19	s. 82 w.	7
Harrisburg, Pa	21	17	22	14	n. 63 e.	9
Philadelphia, Pa	23	20	17	14	n. 45 e.	4
Scranton, Pa	23	17	15	22	n. 49 w.	9
Atlantic City, N. J	22	20	13	20	n. 74 w.	7
Cape May, N. J	25	17	15	12	n. 21 e.	8
Baltimore, Md	26	17	12	18	n. 34 w.	11
Washington, D. C	28	20	11	14	n. 21 w.	8
Cape Henry, Va. †	10	11	14	1	s. 86 e.	13
Lynchburg, Va	22	18	23	9	n. 74 e.	15
Norfolk, Va	23	23	24	4	e.	20
Richmond, Va	30	20	13	8	n. 27 e.	11
Wytheville, Va	15	11	25	21	n. 45 e.	6
South Atlantic States.						
Asheville, N. C	14	23	23	14	s. 45 e.	13
Charlotte, N. C	19	15	36	4	n. 83 e.	32
Hatteras, N. C	24	14	30	9	n. 65 e.	23
Kittyhawk, N. C. *	13	9	17	5	n. 72 e.	13
Raleigh, N. C	23	17	24	6	n. 72 e.	19
Wilmington, N. C	29	11	30	6	n. 53 e.	30
Charleston, S. C	24	12	32	6	n. 65 e.	29
Columbia, S. C	25	10	35	4	n. 64 e.	34
Augusta, Ga	25	10	37	8	n. 62 e.	33
Savannah, Ga	24	15	25	8	n. 62 e.	19
Jacksonville, Fla	21	14	29	5	n. 74 e.	25
Florida Peninsula.						
Jupiter, Fla	27	11	27	10	n. 47 e.	23
Key West, Fla	22	11	33	6	n. 68 e.	29
Sand Key, Fla. †	9	9	14	5	e.	9
Tampa, Fla	31	6	24	9	n. 31 e.	29
Eastern Gulf States.						
Atlanta, Ga	14	15	33	10	s. 88 e.	23
Macon, Ga. †	13	3	14	5	n. 42 e.	14
Birmingham, Ala	13	5	18	4	n. 60 e.	16
Pensacola, Fla. †	19	1	9	7	n. 6 e.	18
Mobile, Ala	28	15	9	17	n. 32 w.	15
Montgomery, Ala	21	7	30	11	n. 54 e.	24
Meridian, Miss. †	13	5	13	6	n. 41 e.	11
Vicksburg, Miss	27	11	20	9	n. 34 e.	19
New Orleans, La	23	12	22	16	n. 29 e.	12
Western Gulf States.						
Shreveport, La	15	19	34	9	s. 81 e.	25
Fort Smith, Ark	12	14	40	7	s. 87 e.	33
Little Rock, Ark	25	17	23	15	n 45 e.	11
Corpus Christi, Tex	10	29	32	3	s. 62 e.	33
Fort Worth, Tex	7	33	23	8	s. 30 e.	30
Galveston, Tex	12	31	26	5	s. 48 e.	28
Palestine, Tex	11	30	25	6	s. 45 e.	27
San Antonio, Tex	8	23	45	0	s. 72 e.	47
Taylor, Tex. †	11	17	4	2	s. 18 e.	6
Ohio Valley and Tennessee.						
Chattanooga, Tenn	22	14	23	13	n. 51 e.	13
Knoxville, Tenn	28	15	18	11	n. 28 e.	15
Memphis, Tenn	28	16	16	15	n. 5 e.	12
Nashville, Tenn	23	17	20	12	n. 53 e.	10
Lexington, Ky. †	7	12	13	3	s. 63 e.	11
Louisville, Ky	21	22	20	11	s. 84 e.	9
Evansville, Ind. †	8	11	16	2	s. 78 e.	14
Indianapolis, Ind	13	31	8	20	s. 34 w.	22
Cincinnati, Ohio	15	23	29	11	s. 66 e.	20
Columbus, Ohio	18	24	22	10	s. 63 e.	13
Pittsburg, Pa	23	20	12	18	n. 63 w.	7
Parkersburg, W. Va	10	31	23	12	s. 28 e.	24
Elkins, W. Va	25	16	9	21	n. 60 w.	14
Lower Lake Region.						
Buffalo, N. Y	12	24	8	27	s. 58 w.	22
Oswego, N. Y	12	35	8	14	s. 15 w.	24
Rochester, N. Y	5	28	7	30	s. 45 w.	32
Syracuse, N. Y	6	35	6	21	s. 28 w.	33
Erie, Pa	13	32	9	18	s. 25 w.	21
Cleveland, Ohio	13	30	23	11	s. 35 e.	21
Sandusky, Ohio †	4	18	3	11	s. 30 w.	16
Toledo, Ohio	12	28	10	20	s. 32 w.	19
Detroit, Mich	10	30	8	21	s. 33 w.	24
Upper Lake Region.						
Alpena, Mich	13	22	11	30	s. 65 w.	21
Escanaba, Mich	14	29	8	24	s. 47 w.	22
Grand Rapids, Mich	12	29	10	23	s. 38 w.	22
Houghton, Mich. †	5	4	13	13	n.	1
Marquette, Mich	14	24	10	28	s. 61 w.	21
Port Huron, Mich	15	29	6	21	s. 47 w.	20
Sault Ste. Marie, Mich	16	14	20	26	n. 72 w.	6
Chicago, Ill	11	30	11	19	s. 23 w.	21
Milwaukee, Wis	14	23	10	26	s. 61 w.	18
Green Bay, Wis	8	32	10	24	s. 30 w.	28
Duluth, Minn	30	13	11	27	n. 43 w.	23
North Dakota.						
Moorhead, Minn	29	18	17	22	n. 68 w.	5
Bismarck, N. Dak	32	10	18	6	n. 5 e.	22
North Dakota—Continued.						
Williston, N. Dak	21	14	21	17	n. 30 e.	8
Upper Mississippi Valley.						
Minneapolis, Minn. *	6	14	6	9	s. 21 w.	8
St. Paul, Minn	15	26	21	17	s. 20 e.	12
La Crosse, Wis. †	10	17	4	6	s. 16 w.	7
Davenport, Iowa	8	31	14	18	s. 10 w.	23
Des Moines, Iowa	13	34	7	18	s. 28 w.	24
Dubuque, Iowa	14	32	13	14	s. 3 w.	18
Keokuk, Iowa	12	36	10	17	s. 16 w.	25
Cairo, Ill	20	28	18	7	s. 54 e.	14
Springfield, Ill	13	32	11	19	s. 23 w.	21
Hannibal, Mo. †	5	16	5	12	s. 32 w.	13
St. Louis, Mo	12	34	14	11	s. 8 e.	22
Missouri Valley.						
Columbia, Mo. *	7	19	7	5	s. 9 e.	12
Kansas City, Mo	13	33	22	10	s. 31 e.	23
Springfield, Mo	11	36	24	3	s. 40 e.	33
Topeka, Kans. *	8	19	4	2	s. 10 e.	11
Lincoln, Nebr	14	35	13	10	s. 8 e.	21
Omaha, Nebr	12	36	10	10	s.	24
Valentine, Nebr	23	14	11	23	n. 53 w.	15
Sioux City, Iowa †	8	16	8	4	s. 27 e.	9
Pierre, S. Dak	29	12	21	9	n. 35 e.	21
Huron, S. Dak	23	20	18	11	n. 67 e.	8
Yankton, S. Dak. †	6	11	11	9	s. 22 e.	5
Northern Slope.						
Havre, Mont	14	12	21	25	n. 63 w.	4
Miles City, Mont	24	17	15	15	n.	7
Helena, Mont	10	17	6	40	s. 78 w.	35
Kalispell, Mont	7	16	12	33	s. 67 w.	23
Rapid City, S. Dak	20	13	16	27	n. 58 w.	13
Cheyenne, Wyo	23	12	10	31	n. 62 w.	24
Lander, Wyo	18	14	9	30	n. 79 w.	21
North Platte, Nebr	20	18	15	20	n. 68 w.	5
Middle Slope.						
Denver, Colo	23	27	12	7	s. 51 e.	6
Pueblo, Colo	20	14	23	19	n. 34 e.	7
Concordia, Kans	15	33	13	7	s. 18 w.	19
Dodge, Kans	16	31	19	5	s. 43 e.	20
Wichita, Kans	14	37	20	1	s. 40 e.	30
Oklahoma, Okla	9	40	18	3	s. 26 e.	34
Southern Slope.						
Abilene, Tex	12	34	28	1	s. 51 e.	35
Amarillo, Tex	7	44	14	8	s. 9 e.	38
Southern Plateau.						
El Paso, Tex	18	10	26	20	n. 37 e.	10
Santa Fe, N. Mex	18	24	20	13	s. 49 e.	9
Flagstaff, Ariz	9	20	13	30	s. 57 w.	20
Phoenix, Ariz	12	13	30	17	s. 86 e.	13
Yuma, Ariz	8	27	20	23	s. 9 w.	19
Independence, Cal	11	15	18	29	s. 70 w.	12
Middle Plateau.						
Carson City, Nev	19	16	8	30	n. 82 w.	22
Winnemucca, Nev	28	8	15	27	n. 31 w.	23
Modena, Utah	10	14	13	35	s. 80 w.	22
Salt Lake City, Utah	22	19	19	16	n. 45 e.	4
Grand Junction, Colo	18	15	21	22	n. 18 w.	3
Northern Plateau.						
Baker City, Oreg	23	23	13	15	w.	2
Boise, Idaho	22	13	11	26	n. 59 w.	18
Lewiston, Idaho †	3	6	20	6	s. 78 e.	14
Pocatello, Idaho	2	23	20	28	s. 21 w.	22
Spokane, Wash	13	23	20	18	s. 11 e.	10
Walla Walla, Wash	7	33	15	17	s. 4 w.	26
North Pacific Coast Region.						
North Head, Wash	26	19	11	21	n. 55 w.	12
Port Crescent, Wash. *	0	5	9	18	s. 61 w.	10
Seattle, Wash	18	20	21	15	s. 72 e.	6
Tacoma, Wash	24	19	4	23	n. 75 w.	20
Tatoosh Island, Wash	9	25	17	19	s. 7 w.	16
Portland, Oreg	21	16	9	31	n. 77 w.	23
Roseburg, Oreg	33	7	20	11	n. 19 e.	28
Middle Pacific Coast Region.						
Eureka, Cal	29	15	6	21	n. 47 w.	20
Mount Tamalpais, Cal	28	8	6	36	n. 56 w.	36
Red Bluff, Cal	37	15	10	7	n. 8 e.	22
Sacramento, Cal	19	27	18	10	s. 45 e.	11
San Francisco, Cal	1	13	0	51	s. 77 w.	52
Point Reyes Light, Cal. *	19	4	1	16	n. 45 w.	21
Southeast Farallon, Cal	34	11	0	36	n. 58 w.	43
South Pacific Coast Region.						
Fresno, Cal	33	3	3	40	n. 51 w.	48
Los Angeles, Cal	10	14	8	34	s. 81 w.	26
San Diego, Cal	25	16	1	33	n. 74 w.	33
San Luis Obispo, Cal	12	21	0	27	s. 72 w.	28
West Indies.						
Basseterre, St. Kitts, W. I	13	7	50	1	n. 83 e.	49
Bridgetown, Barbados	12	11	49	2	n. 89 e.	47
Cienfuegos, Cuba	33	7	32	7	n. 44 e.	36
Colon, Colombia, S. A. †	2	23	8	4	s. 11 e.	21
Curaçoa, W. I	1	11	55	0	s. 80 e.	56
Grand Turk, W. I. †	1	9	22	3	s. 67 e.	21
Hamilton, Bermuda	18	26	25	5	s. 68 e.	22
Havana, Cuba †	3	7	21	3	s. 77 e.	18
Kingston, Jamaica,	19	2	7	9	n. 7 w.	17
Port of Spain, Trinidad †	1	14	24	1	s. 61 e.	26
Puerto Principe, Cuba	19	10	30	11	n. 65 e.	21
Roseau, Dominica, W. I. †	11	8	11	8	n. 45 e.	4
San Juan, Porto Rico	4	32	37	2	s. 51 e.	45
Santiago de Cuba, Cuba	37	13	14	6	n. 18 e.	25
Santo Domingo, Santo Domingo	49	5	8	2	n. 8 e.	44

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Thunderstorms and auroras, September, 1903.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	52	T.					1					2			1		2	4	1									1		1				13	8	T.
		A.																																0	0	A.
Arizona	56	T.	11	2	4	7	14	7	6	5	2	3	3								1	2	2	2	4	14	9	1	14	14		6		133	22	T.
		A.						1																										1	1	A.
Arkansas	57	T.									1	10		1		5	8	7	1				1					5	5	1	3	7		55	13	T.
		A.																																0	0	A.
California	167	T.		4			1			1	1													1	2	4	1	1	2			3		21	11	T.
		A.																																0	0	A.
Colorado	81	T.	2	2	7	4	8	12	2	1	1		9	3	3	1	1									1				6	10	7		80	18	T.
		A.																																0	0	A.
Connecticut	21	T.	1			2	11						3						2					1					18	2				40	8	T.
		A.																																0	0	A.
Delaware	5	T.					2		1					1															2					6	4	T.
		A.																																0	0	A.
Dist. of Columbia	4	T.					1						1	1					1										1					5	5	T.
		A.																																0	0	A.
Florida	47	T.	8	8	11	7	2	1	2	5	2	1	2	4	7	10	10	11	15	7	3	1						2	4	3	3	3		132	25	T.
		A.																																0	0	A.
Georgia	55	T.	1	1	2	2				1	1					2	1	2	3															16	10	T.
		A.																																0	0	A.
Idaho	34	T.		1		1	4		2	1		1		2									3	1	1									17	10	T.
		A.																																0	0	A.
Illinois	92	T.			1	8	1	1	4	19	27	21	1	3	19	27	31	3	1									15	4			4		190	18	T.
		A.						1													1									1				3	3	A.
Indiana	58	T.					11			14	7	9	5		1	4	9	3	1	1	1							1	1			1		69	15	T.
		A.																																0	0	A.
Indian Territory	11	T.								1	1	1	1	1		2		1													1			9	8	T.
		A.																											1					1	1	A.
Iowa	149	T.		4	4	10	5	15	34	15	15	2	17	16	19	26	11											11				13		217	16	T.
		A.																										1						1	1	A.
Kansas	77	T.		1	1	1		2	12	18	21	4	3	8	5	7	8	2	1		3		1	1	1			5			7	4		116	22	T.
		A.																																0	0	A.
Kentucky	41	T.		1			4				4	4										1							1					15	6	T.
		A.																																0	0	A.
Louisiana	46	T.									5		1		1	3	1	5	3												2			21	8	T.
		A.																																0	0	A.
Maine	19	T.					2																						2	1				5	3	T.
		A.																		1	6		1	6										14	4	A.
Maryland	48	T.					15	1	2	2	3	3		6					10										17					59	9	T.
		A.																																0	0	A.
Massachusetts	48	T.					3											1	1		1	1					1	1	33	2				44	9	T.
		A.																			1			3										4	2	A.
Michigan	106	T.	2	3	8	4	2	1	1	5	14	10		7	3	15	12	5	1	1			1	1	3		1	4	3			2		109	24	T.
		A.													1	1					1			1										4	4	A.
Minnesota	67	T.	3	11	12	5	1	4	18	13	2		16	13	16	7	1											6		1		5		134	17	T.
		A.																		1	1									1				3	3	A.
Mississippi	44	T.									4			1	2		5	9														1		22	6	T.
		A.																																0	0	A.
Missouri	95	T.			1	8	19		25	48	41	24	1	13	33	34	36	9	1									29	2		3	6		333	18	T.
		A.																																0	0	A.
Montana	40	T.					9					1											3				1				1			15	5	T.
		A.																			2			2										4	2	A.
Nebraska	142	T.	1	2	11	8	12	7	14	4	18	2	13	11	18	3	1	1	1									1			7	6		141	20	T.
		A.																																0	0	A.
Nevada	40	T.		3	3	1																			1		1			3	3	5		20	8	T.
		A.																																0	0	A.
New Hampshire	19	T.		1		4	6													1									16	3				31	6	T.
		A.																			6			1	1	1		1						10	5	A.
New Jersey	51	T.				1	29					2	5					1	13										32	4				87	8	T.
		A.																																0	0	A.
New Mexico	31	T.			2																					1		1	2	2				8	5	T.
		A.																																0	0	A.
New York	99	T.	2	2		13	2	2	1	1		26	8				2	1	11						1	2			48	2				124	16	T.
		A.																1			1	1		1						1				5	5	A.
North Carolina	56	T.	5	4	1		3	1	2	8	6		1				1	2	5	1					1									41	14	T.
		A.																																0	0	A.
North Dakota	48	T.	1	2	2			3	6	1																						3		18	7	T.
		A.									1									1	9	2		1							2			16	6	A.
Ohio	128	T.				1	15		3	22	18	32	2	1	1	1	4	10			1				1									112	14	T.
		A.																																0	0	A.
Oklahoma	23	T.							1	1	5	3		3	3	3	6	6			1	1			1					1				35	13	T.
		A.			1																													1	1	A.
Oregon	74	T.				1	2																											3	2	T.
		A.																																0	0	A.
Pennsylvania	91	T.					17			8	7	15	3						5										18					73	7	T.
		A.																																0	0	A.
Rhode Island	7	T.					2																						4	2				8	3	T.
		A.																																0	0	A.
South Carolina	46	T.	10	4	5				1	3	2		2	1	4	2	4	8	6								2							54	14	T.
		A.																																0	0	A.
South Dakota	56	T.	3	3	7	5	6	10	16	5	1		11	7	1															1	5	14		95	15	T.
		A.																	1		3	1		1										6	4	A.
Tennessee	56	T.			1		2	1		4	6	2						1	1												1			19	9	T.
		A.																																0	0	A.
Texas	95	T.	2					1	2	3		8	4	3	3	3	3	10	2			1		1		1				3	13	11		74	18	T.
		A.																																0	0	A.
Utah	47	T.	5	6	2	3	8	3	2				3	2	1	1								1					2	6	9	16		70	16	T.
		A.																																0	0	A.
Vermont	16	T.				6	1												3										11					21	4	T.
		A.																		1	4			2										7	3	A.
Virginia	50	T.	2				2		1	4	8	6	6	1					8										10	2				50	11	T.
		A.																																0	0	A.
Washington	64	T.							3			1	1	1	1						1													8	6	T.
		A.																																0	0	A.
West Virginia	43	T.				1	5	1		8	7	12	8																1					43	8	T.
		A.																																0	0	A.
Wisconsin	60	T.	2	8	6	11		3	8	14	6	2	3	16	12	16	5											10				4		126	16	T.
		A.				1															3		1											5	3	A.
Wyoming	31	T.				1	4	3	2	1																					5	2		18	7	T.
		A.																																0	0	A.
Sums	2893	T.	61	73	91	115	232	79	171	236	236	207	133	126	154	172	162	102	97	11	12	7	11	9	16	23	16	94	253	60	73	123		3155		T.
		A.			1	1		2			1				1	1		1	1	4	38	4	2	18	1	1		2	1	3	2			85		A.

Table V.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during September, 1903, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y	17			0.51														0.46			
Alpena, Mich	14			0.41														0.39			
Amarillo, Tex	11			0.53														0.44			
Asheville, N. C	9			0.38														0.36			
Atlanta, Ga	14-15			2.40														0.38			
Atlantic City, N. J	16	4:10 a. m.	8:15 a. m.	1.17	6:50 a. m.	7:30 a. m.	0.53	0.05	0.09	0.15	0.23	0.32	0.44	0.54	0.61	0.63					
Augusta, Ga	3	4:59 p. m.	6:22 p. m.	1.32	5:00 p. m.	5:30 p. m.	T.	0.20	0.56	0.81	0.98	1.17	1.30	1.31							
Baltimore, Md	17			0.53														0.50			
Binghamton, N. Y	10	8:15 p. m.	D. N.	0.87	8:21 p. m.	8:40 p. m.	T.	0.21	0.39	0.50	0.54	0.54	0.58								
Birmingham, Ala	16	7:45 p. m.	8:55 p. m.	0.47	7:50 p. m.	8:07 p. m.	T.	0.10	0.25	0.43	0.46										
Bismarck, N. Dak	11-12			1.63														0.22			
Block Island, R. I	27-28			0.57														0.16			
Boise, Idaho	12			0.11														0.10			
Boston, Mass	27-28			0.98														0.67			
Buffalo, N. Y	17			0.12														0.09			
Cairo, Ill	10			0.30														0.19			
Charleston, S. C	15			0.57														0.30			
Charlotte, N. C	16-17			1.44														0.62			
Chattanooga, Tenn	14			0.40													0.40				
Chicago, Ill	9-10			0.89														0.63			
Cincinnati, Ohio	10	12:30 a. m.	D. N.	0.81	12:59 a. m.	1:04 a. m.	T.	0.25	0.26	0.26	0.27	0.29	0.38	0.49	0.56	0.63	0.72	0.80			
Cleveland, Ohio	17-18			1.18														0.36			
Columbia, Mo	15	10:40 a. m.	12:19 p. m.	0.65	11:36 a. m.	11:53 a. m.	0.05	0.25	0.44	0.51	0.55										
Columbia, S. C	16			0.59														0.59			
Columbus, Ohio	9			0.49													0.45				
Concord, N. H	27			0.52														0.37			
Corpus Christi, Tex	9			0.58														0.55			
Davenport, Iowa	9	6:00 a. m.	2:20 p. m.	2.24	6:38 a. m.	7:16 a. m.	0.14	0.25	0.40	0.62	0.84	1.06	1.27	1.52	1.59						
Do	14	3:18 p. m.	5:32 p. m.	1.56	3:23 p. m.	4:18 p. m.	T.	0.08	0.12	0.20	0.29	0.41	0.51	0.64	0.68	0.76	1.16	1.37	1.48		
Denver, Colo	11-12			0.21								0.11									
Des Moines, Iowa	7			0.26													0.26				
Detroit, Mich	8			0.32														0.28			
Dodge, Kans	11-12			0.14														0.10			
Dubuque, Iowa	12			0.64														0.57			
Duluth, Minn	11-12			1.89														0.32			
Eastport, Me	17-18			0.25														0.19			
Elkins, W. Va	16-17			0.93														0.25			
Erie, Pa	10			0.41														0.41			
Escanaba, Mich	9	1:05 a. m.	1:36 a. m.	0.78	1:06 a. m.	1:25 a. m.	T.	0.09	0.18	0.53	0.77										
Evansville, Ind	27			0.09												0.09					
Fort Smith, Ark	16			0.65														0.33			
Fort Worth, Tex	29-30			2.17														0.46			
Galveston, Tex	16	3:35 p. m.	4:55 p. m.	2.24	3:35 p. m.	4:35 p. m.	0.00	0.19	0.42	0.52	0.53	0.54	0.65	0.90	1.24	1.67	1.94	2.15	2.24		
Grand Junction, Colo	11			0.18														0.08			
Grand Rapids, Mich	14	2:15 a. m.	6:30 a. m.	0.96	4:55 a. m.	5:20 a. m.	0.24	0.08	0.17	0.32	0.52	0.59	0.63								
Green Bay, Wis	12			0.50								0.50									
Hannibal	9-10	6:35 p. m.	4:15 a. m.	2.73	6:42 p. m.	7:02 p. m.	0.01	0.32	0.66	1.08	1.28	1.28	1.30								
Harrisburg, Pa	5			0.38						0.38											
Hatteras, N. C	17-18	10:50 p. m.	5:40 a. m.	2.40	11:25 p. m.	12:15 a. m.	0.04	0.10	0.47	0.76	1.03	1.20	1.36	1.47	1.53	1.63	1.70				
Huron, S. Dak	11-12	10:45 p. m.	8:05 a. m.	1.58	7:19 a. m.	7:35 a. m.	1.02	0.16	0.33	0.51	0.54										
Indianapolis, Ind	10			0.36					0.33												
Jacksonville, Fla	4			0.47														0.36			
Jupiter, Fla	2	3:30 p. m.	9:00 p. m.	1.17	7:43 p. m.	8:30 p. m.	0.06	0.16	0.26	0.52	0.70	0.79	0.90	0.97	1.02	1.06	1.10				
Do	3	12:07 p. m.	10:45 p. m.	2.40	2:12 p. m.	2:40 p. m.	0.45	0.26	0.63	0.79	0.97	1.10	1.16								
Do	11-12	12:20 p. m.	9:50 p. m.	7.42	9:10 a. m.	9:29 a. m.	5.08	0.04	0.18	0.53	0.65	0.65	0.65	0.69	0.83						
Do	13	2:15 a. m.	5:30 a. m.	0.84	2:19 a. m.	2:50 a. m.	T.	0.05	0.19	0.40	0.52	0.67	0.76	0.78							
Kalispell, Mont	5-6			0.64														0.25			
Kansas City, Mo	9	3:25 a. m.	8:50 p. m.	4.98	1:35 p. m.	2:30 p. m.	1.66	0.19	0.48	0.67	0.83	0.93	1.00	1.25	1.50	1.74	1.82	1.87			
Key West, Fla	3	8:40 p. m.	11:05 p. m.	1.22	8:59 p. m.	9:50 p. m.	T.	0.19	0.40	0.56	0.74	0.83	0.89	0.99	1.07	1.12	1.18	1.21			
Knoxville, Tenn	9			0.40								0.40									
La Crosse, Wis	11	7:00 p. m.	7:58 p. m.	0.58	7:30 p. m.	7:50 p. m.	0.03	0.05	0.14	0.29	0.52	0.55									
Lewiston, Idaho	12			0.54														0.14			
Lexington, Ky	10			0.48														0.47			
Lincoln, Nebr	12			0.55														0.39			
Little Rock, Ark	14	6:24 p. m.	9:30 p. m.	0.75	7:07 p. m.	7:35 p. m.	0.08	0.14	0.33	0.41	0.50	0.58	0.63	0.64							
Los Angeles, Cal	27			0.42														0.13			
Louisville, Ky	16			0.24														0.11			
Lynchburg, Va	27	5:05 p. m.	6:10 p. m.	0.68	5:11 p. m.	5:46 p. m.	T.	0.22	0.28	0.40	0.52	0.53	0.54	0.65							
Macon, Ga	14-15	3:00 a. m.	7:41 a. m.	2.37	4:25 p. m.	4:50 p. m.	0.43	0.09	0.21	0.32	0.44	0.50	0.52								
Memphis, Tenn	16			0.12						0.12											
Meridian, Miss	16			0.08				0.08													
Milwaukee, Wis	14	5:30 a. m.	9:00 a. m.	1.23	6:37 a. m.	7:10 a. m.	0.01	0.30	0.49	0.57	0.66	0.73	0.78	0.83	0.87	0.91	1.00	1.13			
Montgomery, Ala	14			0.90														0.21			
Nantucket, Mass	17-18			0.90														0.29			
Nashville, Tenn	27			0.11											0.10						
New Haven, Conn	5	12:59 p. m.	1:24 p. m.	0.42	1:11 p. m.	1:17 p. m.	0.10	0.25	0.31												
Do	27	5:55 p. m.	11:15 p. m.	0.89	6:09 p. m.	6:21 p. m.	T.	0.29	0.43	0.48											
New Orleans, La	11	12:25 p. m.	1:35 p. m.	0.54	12:43 p. m.	1:00 p. m.	0.01	0.23	0.39	0.47	0.51	0.52									
Do	12	1:06 p. m.	3:05 p. m.	1.28	1:06 p. m.	2:00 p. m.	0.00	0.10	0.15	0.36	0.47	0.55	0.68	0.80	0.91	0.98	1.06	1.18	1.26		
New York, N. Y	16	8:28 a. m.	2:10 p. m.	1.27	11:35 a. m.	12:23 p. m.	0.46	0.08	0.17	0.23	0.29	0.35	0.43	0.49	0.58	0.67	0.72	0.76			
Norfolk, Va	2	4:10 a. m.	5:15 a. m.	1.17	4:11 a. m.	4:41 a. m.	T.	0.28	0.52	0.70	0.87	1.05	1.16								
Northfield, Vt	4			0.64														0.61			
North Head, Wash	6			0.71														0.45			
Oklahoma, Okla	13-14			0.62														0.42			
Omaha, Nebr	12			0.59														0.36			
Palestine, Tex																					
Parkersburg, W. Va	10-11			0.67								0.36									
Pensacola, Fla	16			0.38														0.29			
Philadelphia, Pa	5			0.80														0.69			
Pittsburg, Pa	9			0.35													0.31				
Pocatello, Idaho	30			0.09														0.05			
Portland, Me	5			0.52														0.52			
Portland, Oreg	28			0.34														0.24			
Pueblo, Colo	7			0.04														0.04			
Raleigh, N. C	17			0.66														0.54			
Richmond, Va	17			0.41														0.33			
Rochester, N. Y	17			0.73														0.31			
Sacramento, Cal. *																					
St. Louis, Mo	15	2:40 p. m.	4:55 p. m.	1.06	2:53 p. m.	3:30 p. m.	T.	0.15	0.37	0.50	0.59	0.76	0.89	0.96	0.99						
St. Paul, Minn	11-12	6:20 p. m.	5:22 a. m.	5.00	8:10 p. m.	9:05 p. m.	0.02	0.15	0.22	0.33	0.43	0.52	0.73	0.81	0.90	1.02	1.12	1.23			
Salt Lake City, Utah	28-29			0.48														0.37			

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
San Antonio, Tex	10	10:32 a. m.	11:15 a. m.	1.57	10:38 a. m.	11:13 a. m.	T.	0.27	0.50	0.76	0.98	1.14	1.38	1.56	1.57						
San Diego, Cal	28			T.				T.													
Sandusky, Ohio	16			0.71														0.21			
San Francisco, Cal	29			T.				T.													
Savannah, Ga	2	1:02 p. m.	2:00 p. m.	1.95	1:15 p. m.	1:48 p. m.	0.08	0.15	0.53	1.09	1.35	1.59	1.78	1.86							
Scranton, Pa	17			0.40														0.25			
Seattle, Wash	28			0.69														0.20			
Shreveport, La	29			0.16							0.16										
Spokane, Wash	11-12			0.41														0.22			
Springfield, Ill	13			0.40														0.38			
Syracuse, N. Y	10-11			0.54														0.26			
Tampa, Fla	4	4:55 p. m.	6:30 p. m.	1.59	5:25 p. m.	6:00 p. m.	0.19	0.08	0.26	0.50	0.67	1.02	1.35	1.45	1.47						
Do	12-13	9:35 p. m.	8:15 a. m.	2.14	7:02 a. m.	7:45 a. m.	0.73	0.06	0.33	0.65	0.84	0.85	0.87	0.98	1.23	1.39	1.40				
Do	18	4:10 p. m.	6:05 p. m.	1.70	4:27 p. m.	4:57 p. m.	0.01	0.13	0.50	0.89	1.11	1.36	1.51	1.55							
Taylor, Tex.	10	5:50 p. m.	8:55 p. m.	0.54	6:03 p. m.	6:10 p. m.	0.10	0.25	0.32	0.34											
Toledo, Ohio	16			0.55														0.51			
Topeka, Kans	9			1.07														0.32			
Valentine, Nebr	11-12			0.39									0.21								
Vicksburg, Miss	15	2:54 p. m.	3:35 p. m.	0.60	3:01 p. m.	3:10 p. m.	0.04	0.29	0.54												
Do	16	3:21 p. m.	6:25 p. m.	0.85	5:31 p. m.	5:45 p. m.	0.15	0.25	0.44	0.62											
Washington, D. C	17	2:10 p. m.	3:20 p. m.	0.39	2:20 p. m.	2:30 p. m.	T.	0.25	0.34												
Wichita, Kans	8-9			0.80														0.38			
Wilmington, N. C	16			0.34														0.29			
Wytheville, Va	16			0.65														0.27			
Yankton, S. Dak	30			0.71														0.62			
Bridgetown, Barbados	15	3:23 p. m.	4:09 p. m.	1.54	3:25 p. m.	3:55 p. m.	T.	0.32	0.40	0.70	1.05	1.27	1.48	1.52							
Cienfuegos, Cuba	3-4	7:14 p. m.	D. N.	1.40	7:20 p. m.	7:50 p. m.	0.02	0.08	0.24	0.35	0.58	0.73	0.81								
Do	20	5:07 p. m.	7:30 p. m.	1.16	5:51 p. m.	6:18 p. m.	0.24	0.24	0.38	0.49	0.62	0.69	0.75	0.76							
Havana, Cuba	1	7:14 p. m.	7:50 p. m.	0.54	7:19 p. m.	7:35 p. m.	T.	0.17	0.38	0.48	0.51	0.53									
Puerto Principe, Cuba	4	4:20 p. m.	6:30 p. m.	2.21	4:30 p. m.	5:40 p. m.	0.03	0.26	0.43	0.52	0.58	0.64	0.66	0.73	0.97	1.22	1.29	1.75	2.05	2.17	2.18
San Juan, Porto Rico	22			0.67														0.50			
Santo Domingo, W. I	30	12:35 p. m.	1:00 p. m.	0.40	12:36 p. m.	12:41 p. m.	T.	0.34	0.36												

* No precipitation during the month.

TABLE VI.—*Data furnished by the Canadian Meteorological Service, September, 1903.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Temperature. Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Precipitation. Total.	Departure from normal.	Depth of snow.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
St. Johns, N. F	29.76	29.90	−.07	54.2	+ 0.2	61.5	47.0	3.57	−0.14	....
Sydney, C. B. I	29.98	30.02	+.01	58.2	+ 1.7	66.9	49.5	4.50	+1.22	....
Halifax, N. S	29.96	30.06	+.02	60.4	+ 2.8	69.4	51.4	4.23	+0.52	....
Grand Manan, N. B	30.00	30.05	+.02	58.4	+ 2.3	66.0	50.8	1.97	−1.20	....
Yarmouth, N. S	30.03	30.10	+.05	56.9	+ 0.8	63.6	50.2	4.97	+1.52	....
Charlottetown, P. E. I	29.97	30.01	.00	58.0	+ 0.7	65.7	50.4	4.17	+0.77	....
Chatham, N. B	29.97	29.99	−.01	57.6	+ 2.2	68.6	46.7	2.05	−0.66	....
Father Point, Que	29.95	29.97	−.01	51.7	+ 1.3	59.0	44.4	0.74	−2.39	....
Quebec, Que	29.71	30.03	+.02	57.8	+ 2.7	67.8	47.8	1.14	−2.53	....
Montreal, Que	29.86	30.06	+.02	58.8	+ 0.4	66.6	51.0	1.26	−2.04	....
Bissett, Ont	29.44	30.05	+.02	54.8	− 0.9	67.5	42.1	2.70	−0.58	....
Ottawa, Ont	29.73	30.05	+.01	57.9	+ 0.4	67.5	48.3	2.14	−0.55	....
Kingston, Ont	29.77	30.08	+.04	61.3	+ 1.3	69.4	53.3	1.11	−1.69	....
Toronto, Ont	29.71	30.08	+.02	61.0	+ 2.0	71.3	50.6	0.42	−2.83	....
White River, Ont	28.66	29.98	.00	48.5	− 1.8	59.4	37.6	3.08	+0.31	0.7
Port Stanley, Ont	29.47	30.11	+.05	60.0	+ 0.5	69.3	50.8	2.02	−0.71	....
Saugeen, Ont	29.37	30.08	+.03	59.2	+ 1.7	68.3	50.0	5.05	+2.11	....
Parry Sound, Ont	29.31	29.99	−.04	58.2	+ 2.2	68.3	48.1	4.55	+0.88	....
Port Arthur, Ont	29.26	29.97	−.01	50.0	− 2.2	58.6	41.4	5.56	+2.08	....
Winnipeg, Man	29.10	29.93	−.01	49.6	− 2.9	60.9	38.3	2.77	+0.74	....
Minnedosa, Man	28.14	29.96	+.02	47.0	− 3.5	57.1	36.9	2.16	+0.80	5.8
Qu'Appelle, Assin	27.68	29.93	+.01	47.0	− 4.1	57.4	36.5	0.92	−0.41	3.2
Medicine Hat, Assin	27.64	29.91	−.01	54.1	− 0.9	66.4	41.8	0.65	−0.53	...
Swift Current, Assin	27.39	29.96	+.04	49.3	− 3.8	60.7	37.8	1.04	−0.18	....
Calgary, Alberta	26.38	29.91	−.01	47.1	− 2.7	58.6	35.6	1.81	+0.45	4.0
Banff, Alberta	25.36	29.95	+.02	43.5	− 2.3	52.4	34.6	2.68	+1.01	3.0
Edmonton, Alberta	27.59	29.88	−.02	46.6	− 2.7	57.4	35.9	1.12	−0.21	0.4
Prince Albert, Sask	28.35	29.92	+.02	44.0	− 4.4	52.9	35.1	2.17	+0.89	8.0
Battleford, Sask	28.21	29.96	+.06	46.1	− 5.7	57.4	34.7	1.01	−0.24	....
Kamloops, B. C	28.72	29.94	−.03	53.1	− 4.3	62.2	44.0	2.34	+1.49	....
Victoria, B. C	29.95	30.05	+.04	55.6	+ 0.8	61.5	49.6	3.76	+1.60	....
Barkerville, B. C	25.66	29.98	.00	40.2	− 6.5	48.1	32.3	7.74	+4.83	T.
Hamilton, Bermuda	29.95	30.11	+.04	78.4	+ 1.0	83.3	73.5	8.38	+1.87	....
Dawson City, Yukon	......	......	......	......	......	......	......	......	......	......

TABLE VII.—*Heights of rivers referred to zeros of gages, September, 1903.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Mississippi River.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
St. Paul, Minn	1,954	14	11.9	22-24	3.8	1, 2	8.0	8.1
Red Wing, Minn	1,914	14	11.9	19	3.3	3	7.5	8.6
Reeds Landing, Minn	1,884	12	11.0	18, 19	3.3	1-7	6.9	7.7
La Crosse, Wis	1,819	12	13.2	20, 21	4.6	5, 6, 8	8.4	8.6
Prairie du Chien, Wis	1,759	18	16.7	25	5.1	7	9.4	11.6
Dubuque, Iowa	1,699	15	17.4	27	5.8	8, 12	9.6	11.6
Leclaire, Iowa	1,609	10	10.8	29, 30	3.9	8	5.9	6.9
Davenport, Iowa	1,593	15	13.6	30	5.0	8, 9	7.5	8.6
Muscatine, Iowa	1,562	16	14.6	30	6.2	9	8.8	8.4
Galland, Iowa	1,472	8	6.6	30	3.3	9	4.4	3.3
Keokuk, Iowa	1,463	15	11.8	30	5.7	9	8.0	6.1
Hannibal, Mo	1,402	13	12.4	30	7.4	9	9.6	5.0
Grafton, Ill	1,306	23	12.9	30	9.1	9	11.4	3.8
St. Louis, Mo	1,264	30	21.8	17	16.7	27	19.0	5.1
Chester, Ill	1,189	30	17.8	17	13.7	27, 28	15.6	4.1
New Madrid, Mo	1,003	34	17.3	19	13.2	1	15.3	4.1
Memphis, Tenn	843	33	13.5	20, 21	9.6	2	11.7	3.9
Helena, Ark	767	42	19.3	21-23	14.6	3	17.1	4.7
Arkansas City, Ark	635	42	21.0	23	16.5	4, 5	18.7	4.5
Greenville, Miss	595	42	16.6	24, 25	13.1	5	14.9	3.5
Vicksburg, Miss	474	45	18.4	26, 27	14.7	7	16.5	3.7
Mississippi River—Cont'd.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Natchez, Miss	373	46	18.6	27, 28	15.6	9	17.2	3.0
Baton Rouge, La	240	35	10.5	1	8.1	8, 9	9.1	2.4
Donaldsonville, La	188	28	7.3	1	5.4	8	6.2	1.9
New Orleans, La	108	16	5.7	1	4.3	10, 18	4.9	1.4
Yellowstone River.								
Glendive, Mont	98	17	2.9	17	1.5	9, 10	2.1	1.4
James River.								
Lamoure, N. Dak	......	25	− 0.1	20-28	− 0.2	1-19, 29, 30	−0.2	0.1
Huron, S. Dak	210	9	1.0	12	0.4	23-28	0.6	0.6
Missouri River.								
Townsend, Mont	2,504	10	3.7	14-30	3.3	1-12	3.5	0.4
Fort Benton, Mont	2,285	12	0.9	15, 28, 29	0.4	3-5, 8	0.7	0.5
Bismarck, N. Dak	1,309	14	4.2	4	1.7	15, 16	2.6	2.5
Pierre, S. Dak	1,114	14	5.5	3	3.3	28	4.1	2.2
Sioux City, Iowa	784	19	9.0	8	6.4	29, 30	8.1	2.6
Omaha, Nebr	669	18	10.0	1	8.4	30	9.3	1.6
St. Joseph, Mo	481	10	10.3	1	3.7	30	6.6	6.6
Kansas City, Mo	388	21	18.0	1	9.9	30	13.5	8.1
Boonville, Mo	199	20	16.1	3	10.1	30	13.9	6.0
Hermann, Mo	103	24	16.3	16	9.9	30	13.8	6.4

TABLE VII.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Chippewa River.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Chippewa Falls, Wis	90	16	13.5	16, 17	2.0	3, 5	5.6	11.5
Illinois River.								
Peoria, Ill	135	14	12.5	21, 22	8.7	8, 9	10.6	3.8
Youghiogheny River.								
Confluence, Pa	59	10	1.2	10	−0.4	29, 30	−0.1	1.6
West Newton, Pa	15	23	1.6	11	0.1	27–30	0.5	1.5
Allegheny River.								
Warren, Pa	177	14	3.9	1	1.0	10, 26–30	1.6	2.9
Oil City, Pa	123	13	3.8	1	0.8	29, 30	1.7	3.0
Parker, Pa	73	20	5.8	1	0.7	30	1.9	5.1
Freeport, Pa	29	20	9.4	1	2.4	30	4.2	7.0
Clarion River.								
Clarion, Pa	32	10	4.0	18	0.5	28	1.7	3.5
Monongahela River.								
Weston, W. Va	161	18	−0.9	1, 2	−1.3	16, 17, 22–30	−1.2	0.4
Fairmont, W. Va	119	25	1.9	1, 2	1.3	5, 20–23, 29, 30	1.5	0.6
Greensboro, Pa	81	18	6.4	1–6, 21	6.0	30	6.2	0.4
Lock No. 4, Pa	40	28	8.2	11, 12	6.9	29, 30	7.7	1.3
Conemaugh River.								
Johnstown, Pa	64	7	2.6	1	0.8	28–30	1.5	1.8
Red Bank Creek.								
Brookville, Pa	35	8	0.9	18	0.2	12–17, 29, 30	0.4	0.7
Beaver River.								
Ellwood Junction, Pa	10	14	4.5	1–4	2.0	23–30	3.0	2.5
Great Kanawha, River.								
Charleston, W. Va	58	30	7.2	3	6.5	1	6.8	0.7
Little Kanawha River.								
Glenville, W. Va	103	20	1.8	3	−2.8	30	−0.8	4.6
New River.								
Radford, Va	155	14	3.0	17	−0.2	30	0.4	3.2
Hinton, W. Va	95	14	3.5	18	1.2	17, 28–30	1.5	2.3
Cheat River.								
Rowlesburg, W. Va	36	14	2.2	19	1.0	16–18, 29, 30	1.4	1.2
Ohio River.								
Pittsburg, Pa	966	22	7.2	1	3.0	5	5.8	4.2
Davis Island Dam, Pa	960	25	8.8	1	2.6	30	4.3	6.2
Beaver Dam, Pa	925	27	12.9	1	3.0	30	5.6	9.9
Wheeling, W. Va	875	36	11.7	1	1.8	29	5.3	9.9
Parkersburg, W. Va	785	36	10.8	3	3.4	30	5.9	7.4
Point Pleasant, W. Va	705	39	10.3	1	2.0	30	4.6	8.3
Huntington, W. Va	660	50	13.8	4	4.6	30	7.7	9.2
Catlettsburg, Ky	651	50	12.7	4	2.3	30	5.9	10.4
Portsmouth, Ohio	612	50	12.9	4, 5	3.8	30	7.0	9.1
Cincinnati, Ohio	499	50	14.3	6	5.1	1	8.2	9.2
Madison, Ind	413	46	11.6	7	3.9	1	7.3	7.7
Louisville, Ky	367	28	6.8	6, 7	3.3	2	4.6	3.5
Evansville, Ind	184	35	9.0	10	3.4	5.6	5.2	5.6
Paducah, Ky	47	40	6.5	16, 17	3.6	30	5.0	2.9
Cairo, Ill	1,073	45	20.6	18, 19	15.7	1	18.3	4.9
Muskingum River.								
Zanesville, Ohio	70	20	7.7	1	5.2	26, 27	5.8	2.5
Scioto River.								
Columbus, Ohio	110	17	2.8	11	1.8	1–5	2.1	1.0
Miami River.								
Dayton, Ohio[1]	77	18	0.8	4, 11, 26	0.6	1, 2, 6, 28	0.7	0.2
Wabash River.								
Mount Carmel, Ill	50	15	1.3	1, 2	0.5	20–22, 29, 30	0.8	0.8
Licking River.								
Falmouth, Ky	30	25	0.8	1	0.2	21–30	0.3	0.6
Kentucky River.								
High Bridge, Ky	117	17	10.5	1	8.8	20–30	9.1	1.7
Frankfort, Ky	65	31	6.8	2	5.0	25, 30	5.6	1.8
Clinch River.								
Speers Ferry, Va	156	20	−0.8	6	−1.2	23	−1.0	0.4
Clinton, Tenn	52	25	3.4	2	2.0	16–18, 26–28	2.5	1.4
Holston River.								
Bluff City, Tenn	170	15	0.4	1	0.0	24, 25, 27–30	0.0	0.4
Rogersville, Tenn	103	14	1.5	19	1.1	29, 30	1.3	0.4
French Broad River.								
Asheville, N. C	144	6	0.4	17	−0.7	29, 30	−0.3	1.1
Leadvale, Tenn	70	15	−0.5	19	−1.8	11, 12, 29, 30	−1.4	1.3
Hiwassee River.								
Charleston, Tenn	18	22	1.4	17	0.4	30	0.8	1.0
Tennessee River.								
Knoxville, Tenn	635	29	0.7	6, 19	−0.1	29, 30	0.3	0.8
Kingston, Tenn	556	25	1.1	1–3	0.6	29, 30	0.9	0.5
Chattanooga, Tenn	452	33	1.7	1	0.6	30	1.2	1.1
Bridgeport, Ala	402	24	0.7	1, 2	0.1	29, 30	0.4	0.6
Florence, Ala	255	16	0.2	1	−0.3	30	−0.1	0.5
Riverton, Ala	225	25	−0.6	1	−1.6	16, 30	−1.2	1.0
Johnsonville, Tenn	95	24	1.4	1	0.6	18–30	0.6	1.1
Cumberland River.								
Burnside, Ky	516	50	2.0	1	0.3	29, 30	0.5	1.7
Carthage, Tenn	305	40	1.5	1, 5	0.0	28–30	0.6	1.5
Nashville, Tenn	189	40	2.5	2	0.8	28–30	1.5	1.7
Clarksville, Tenn	126	42	3.3	1, 3, 4	0.2	30	1.6	3.1
Arkansas River.								
Wichita, Kans	832	10	1.3	13	0.5	25–28	0.8	0.8
Webbers Falls, Ind. T	465	23	5.7	15	2.2	11, 12	3.1	3.5
Fort Smith, Ark	403	22	5.6	16	2.0	13	3.1	3.6
Dardanelle, Ark	256	21	4.7	18	1.8	15, 30	2.8	2.9
Little Rock, Ark	176	23	6.0	1, 20, 21	3.6	16, 30	4.5	2.4
White River.								
Newport, Ark	150	26	1.7	19, 20, 22–25	1.1	15, 16	1.4	0.6
Yazoo River.								
Yazoo City, Miss	80	25	0.5	1	−2.2	23–30	−1.5	2.7
Red River.								
Arthur City, Tex	638	27	6.7	16	5.0	4–14, 27–30	5.3	1.7
Fulton, Ark	515	28	8.0	21, 22	6.0	16, 17	7.0	2.0
Shreveport, La	327	29	1.6	1	−1.0	30	−0.1	2.6
Alexandria, La	118	33	4.2	1	0.7	25, 26	1.8	3.5
Ouachita River.								
Camden, Ark	304	39	14.5	1	4.7	18	7.0	9.8
Monroe, La	122	40	6.8	6	2.1	22	3.6	4.7
Atchafalaya River.								
Melville, La	100	31	17.6	1	13.7	10	15.0	3.9
Passaic River.								
Chatham, N. J	69	......	5.3	18	2.4	16	3.4	2.9
Pompton River.								
Pompton Plains, N. J	6	......	4.9	17, 18	4.0	27, 30	4.3	0.9
Susquehanna River.								
Binghamton, N. Y	306	16	7.7	1	2.9	30	3.7	4.8
Towanda, Pa	262	16	7.8	1	0.5	35	2.2	7.3
Wilkesbarre, Pa	183	17	14.3	1	3.6	30	5.8	10.7
Harrisburg, Pa	69	17	10.0	1	1.8	29, 30	3.7	8.2
West Branch Susquehanna.								
Lockhaven, Pa	65	12	1.8	1	0.2	29, 30	0.7	1.6
Williamsport, Pa	39	20	5.8	1	1.1	30	2.6	4.7
Juniata River.								
Huntingdon, Pa	90	24	4.8	1	3.0	30	3.7	1.8
Shenandoah River.								
Riverton, Va	58	22	6.0	19	−0.5	8, 9	0.4	6.5
Potomac River.								
Cumberland, Md	290	8	2.9	9	0.8	30	2.0	2.1
Harpers Ferry, W. Va	172	18	5.5	19	0.4	10, 17, 30	1.3	5.1
James River.								
Lynchburg, Va	260	18	6.0	18	0.5	16	1.7	5.5
Richmond, Va	111	12	2.0	20	0.0	11, 16–18, 29	0.4	2.0
Dan River.								
Danville, Va	55	8	1.5	18	−0.2	26–30	0.1	1.7
Roanoke River.								
Clarksville, Va	196	12	6.3	2	3.1	26, 27, 29, 30	4.1	3.2
Weldon, N. C	129	30	16.4	20	9.0	10, 28, 29	10.6	7.4
Cape Fear River.								
Fayetteville, N. C	112	38	9.0	19	1.3	30	2.9	7.7
Edisto River.								
Edisto, S. C	75	6	5.0	1, 2	3.0	17, 18	4.2	2.0
Pedee River.								
Cheraw, S. C	149	27	16.7	19	1.7	29, 30	4.0	15.0
Black River.								
Kingstree, S. C	52	12	8.4	25–27	4.2	16	6.3	4.2
Lynch Creek.								
Effingham, S. C	35	12	6.8	26	3.3	12–15	4.4	3.5
Santee River.								
St. Stephens, S. C	97	12	7.4	23	2.7	11	5.3	4.7
Congaree River.								
Columbia, S. C	37	15	2.2	17	0.6	23	1.0	1.6
Wateree River.								
Camden, S. C	45	24	20.0	18	5.8	30	8.2	14.3
Waccamaw River.								
Conway, S. C	40	7	5.3	1	2.2	29, 30	3.7	3.1
Savannah River.								
Calhoun Falls, S. C	347	15	4.2	16	2.5	9	2.9	1.7
Augusta, Ga	268	32	11.5	18	6.9	29, 30	7.7	4.6
Broad River.								
Carlton, Ga	30	11	4.4	16	2.1	4–6, 11–14	2.5	2.3
Flint River.								
Albany, Ga	80	20	15.7	23	0.3	9	5.9	15.4
Chattahoochee River.								
Oakdale, Ga	305	18	8.0	16	0.0	1–9, 27–30	1.2	8.0
Westpoint, Ga	239	20	5.3	17	2.0	10, 11, 13, 14	2.6	3.3
Ocmulgee River.								
Macon, Ga	125	18	14.7	16	2.0	5	4.0	12.7
Abbeville, Ga	50	11	10.8	23	1.4	14	4.3	9.4
Oconee River.								
Dublin, Ga	79	20	10.7	20	−0.2	5, 7–10	2.1	10.9
Coosa River.								
Rome, Ga	271	30	2.0	18	0.4	29, 30	0.8	1.6
Gadsden, Ga	144	18	1.0	19	−0.4	30	−0.1	1.4
Alabama River.								
Montgomery, Ala	265	35	2.3	18	0.4	12, 14, 29	1.0	1.9
Selma, Ala	212	35	2.5	20	0.0	16	1.0	2.5
Tombigbee River.								
Columbus, Miss	303	33	−3.4	1, 2	−3.8	23, 24	−3.6	0.4
Demopolis, Ala	155	35	−1.1	1	−3.1	30	−2.3	2.0
Black Warrior River.								
Tuscaloosa, Ala	90	43	5.1	1	3.7	27, 28	4.2	1.4
Sabine River.								
Logansport, La	180	25	4.4	1	1.0	28–30	1.9	3.4
Orange, Tex	10	7	1.3	4–8	1.0	1–3, 14–30	1.1	0.3
Neches River.								
Rockland, Tex	100	20	1.7	1	−0.3	29, 30	0.3	2.0
Beaumont, Tex	20	15	1.8	13	0.2	16	1.0	1.6
Trinity River.								
Dallas, Tex	330	25	3.1	30	1.8	15–18, 26–28	2.1	1.3
Riverside, Tex	100	40	2.7	2, 3	−0.2	26–30	0.7	2.9
Liberty, Tex	42	25	......	......	......	......	......	......
Brazos River.								
Kopperl, Tex	369	21	3.4	30	−1.0	1, 4–17	−0.5	4.4
Waco, Tex	301	24	4.6	25	2.2	18, 19	2.9	2.4
Hempstead, Tex	215	40	1.0	3, 29	−0.7	23–26	0.0	1.7
Booth, Tex	76	39	2.7	1, 2	0.7	30	1.7	2.0
Colorado River.								
Ballinger, Tex	400	21	13.0	30	1.2	23–28	2.2	11.8
Austin, Tex	214	18	3.5	21	1.0	8	1.8	2.5
Columbus, Tex	100	24	10.2	23	6.9	21	7.8	3.3
Red River of the North.								
Moorhead, Minn	418	26	7.7	18–22	7.[illegible]	9–11	7.5	0.5
Columbia River.								
Umatilla, Oreg	270	25	7.2	1	5.2	23, 24	6.2	2.0
The Dalles, Oreg	166	40	10.3	1	7.0	23–27	8.5	3.3
Willamette River.								
Albany, Oreg	118	20	2.5	14	1.0	27–30	1.6	1.5
Portland, Oreg	12	15	4.9	7	2.4	29	4.0	2.5
Sacramento River.								
Red Bluff, Cal	265	23	0.0	1–6	−0.2	18–30	−0.1	0.2
Sacramento, Cal	64	29	7.3	1–6	7.0	9–18, 26, 27, 29, 30	7.1	0.3

HAWAIIAN CLIMATOLOGICAL DATA.

By R. C. LYDECKER, Acting Territorial Meteorologist.

Rainfall data for September, 1903.

Stations.	Elevation.	Amount.	Stations.	Elevation.	Amount.
HAWAII.			MAUI—Cont'd.		
HILO, e. and ne.	*Feet.*	*Inches.*		*Feet.*	*Inches.*
Waiakea	50	13.46	Haleakala Ranch	2,000	6.54
Hilo (town)	100	....	Wailuku, ne	250	1.39
Kaumana	1,250	21.52	OAHU.		
Pepeekeo	100	12.90	Punahou (W. B.), sw.	47	5.75
Hakalau	200	14.08	Kulaokahua (Castle), sw.	50	4.06
Honohina	300	15.33	Makiki Reservoir	120	6.32
Puuohua	1,050	19.54	U. S. Naval Station, sw.	6	3.67
Laupahoehoe	500	10.01	Kapiolani Park, sw.	10	1.86
Ookala	400	6.75	College Hills	175	6.74
HAMAKUA, ne.			Manoa (Woodlawn Dairy), e.	285	17.22
Kukaiau	250	2.43	Manoa (Rhodes Gardens)	360	22.18
Paauilo	300	1.89	School street (Bishop), sw.	.....	....
Paauhau	300	1.83	Insane Asylum, sw.	30	4.83
Honokaa (Mill)	425	2.87	Kamehameha School	.....	....
Honokaa (Meinicke)	1,100	....	Kalihi-Uka, sw.	485	....
Kukuihaele	700	2.90	Nuuanu (W. W. Hall), sw.	50	6.01
KOHALA, n.			Nuuanu (Wyllie street)	250	....
Awini Ranch	1,100	5.45	Nuuanu (Elec. Station), sw.	405	8.75
Niulii	200	3.54	Nuuanu (Luakaha), c.	850	20.97
Kohala (Mission)	521	2.65	U. S. Experiment Station	350	8.04
Kohala (Sugar Co.)	270	2.70	Kailiula	1,150	18.43
Hawi, Mill	700	2.74	Laniakea (Nahuina)	1,150	....
Puakea Ranch	600	1.73	Tantalus Heights (Frear)	1,360	18.74
Puuhue Ranch	1,847	1.06	Waimanalo, ne.	25	3.71
Waimea	2,720	1.58	Maunawili, ne.	300	6.63
KONA, w.			Kaneohe	100	2.87
Huehue	2,000	4.14	Ahuimanu, ne.	350	6.70
Holualoa	1,350	7.86	Kahuku, n	25	1.53
Kaukahoku Leheula	3,500	....	Waialua	37	....
Kainaliu	1,470	7.69	Wahiawa	900	3.12
Kealakekua	1,580	8.24	Ewa Plantation, s.	60	1.83
Napoopoo	25	5.20	U. S. Magnetic Station	45	1.22
Hoopuloa	1,650	....	Waipahu	200	1.50
Hoopuloa	2,500	....	Moanalua	15	3.61
Puuwaawaa Ranch	2,700	....	Pacific Heights	700	....
Huehue	2,000	....	KAUAI.		
KAU, se.			Lihue (Grove Farm), e.	200	3.26
Kahuku Ranch	1,680	2.10	Lihue (Molokoa), e.	300	4.20
Honuapo	15	0.81	Lihue (Kukaua), e.	1,000	9.93
Naalehu	650	1.56	Kealia, e.	15	....
Hilea	310	1.30	Kilauea (Plantation), ne	325	3.94
Pahala	850	....	Hanalei, n.	10	11.57
Moaula	1,700	....	Waioli	15	....
Volcano House	4,000	5.46	Haena	15	....
PUNA, e.			Waiawa	32	....
Olaa, Mountain View (Russel)	1,690	....	Eleele	150	7.46
Olaa (Plantation)	.....	....	Wahiawa (Mountain)	3,000	23.50
Kapoho	110	8.52	McBryde (Residence)	850	11.92
Pahoa	600	12.12	Lawai (Gov. Road)	450	11.61
MAUI.			Lawai, w	225	7.85
Lahaina	40	....	Lawai, e.	800	10.33
Waiopae Ranch	700	1.26	Koloa	100	5.72
Kaupo (Mokulau), s.	285	11.35			
Kipahulu, s	308	10.53	*Delayed August reports.*		
Nahiku, ne	850	20.16	Holualoa	.....	10.67
Nahiku	1,600	....	Kapoho	.....	4.62
Haiku, n.	700	10.06	Kula (Erehwon)	.....	5.39
Kula (Waiakoa), n.	2,700	1.30	Waiawa	.....	0.50
Kula (Erehwon), n.	4,000	....	Kahuku Ranch	.....	1.89
Puuomalei, n.	1,400	8.73	Haleakala Ranch	.....	1.30
Paia	180	....			

NOTE.—The letters n, s, e, w, and c show the exposure of the station relative to the winds.

Temperature table for September, 1903.

Stations.	Elevation.	Mean max.	Mean min.	Cor. av'ge.	Highest.	Lowest.
	Feet.	°	°	°	°	°
Hilo	40	83.4	68.7	75.4	86	66
Pepeekeo	100	78.5	70.8	74.0	82	69
Kohala	521	80.0	68.3	73.5	85	67
Waimea	2,730	73.4	61.9	67.0	82	58
Volcano house	4,000	71.9	54.6	62.6	76	49
Waiakoa	2,700	83.5	60.4	71.3	92	56
United States Magnetic Station	50	87.1	70.2	78.0	89	67
W. R. Castle	50	82.9	72.9	77.2	85	70
United States Experimental Station	350	84.2	71.2	77.0	87	69

GENERAL SUMMARY FOR SEPTEMBER, 1903.

Honolulu.—Temperature mean for the month, 77.5°; normal, 77.3°; average daily maximum, 83.0°; average daily minimum, 72.5°; mean daily range, 10.5°; greatest daily range, 14° (22d and 24th); least daily range, 6° (30th); highest temperature, 84°; lowest temperature, 69°.

Barometer average, 29.991; normal, 29.968; highest, 30.08 (5th and 6th); lowest, 29.90 (13th); greatest 24-hour change, that is from any given hour on one day to the same hour on the next, .05; lows passed this point, 12th, 13th, and 16th; highs, 5th and 6th.

Relative humidity average, 69.7 per cent; normal, 68.5 per cent; mean dew-point, 66.1°; normal, 66°; mean absolute moisture, 6.96 grains per cubic foot; normal, 7.06 grains.

Rainfall, 5.75 inches; normal, 1.99 inches; rain record days, 19; normal, 18; greatest rainfall in one day, 2.32 (from 9 a. m. 23d to 9 a. m. 24th); total at Luakaha, 20.97; normal, 10.21; at Kapiolani Park, 1.86; normal, 0.38.

Meteorological Observations at Honolulu, September, 1903.

The station is at 21° 18′ N., 157° 50′ W. It is the Hawaiian Weather Bureau station Punahou. (See fig. 2, No. 1, in the MONTHLY WEATHER REVIEW for July, 1902, page 365.)

Hawaiian standard time is $10^{h}\ 30^{m}$ slow of Greenwich time. Honolulu local mean time is $10^{h}\ 31^{m}$ slow of Greenwich.

The pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

Rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m. Greenwich time, or 2:30 a. m. Honolulu time.									Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	29.97	76	69	83	72	66.5	70	ne.	3	2-5	30.02	29.93	0.03
2	29.90	73	68	84	74	64.3	64	ne.	1-3	2	30.03	29.94	0.01
3	30.00	75	66.5	83	72	64.0	65	ne.	1-3	2	30.03	29.96	0.00
4	30.01	74	69	84	74	64.7	61	ne.	2-3	1	30.04	29.96	0.00
5	30.02	73	69.5	83	70	66.3	72	ne.	2-4	4-8-5	30.06	29.98	0.06
6	30.03	74	69.5	82	71	66.0	72	ne.	4	9-4	30.08	30.01	0.35
7	30.03	75	69	83	73	66.5	73	ne.	4-5	8-3	30.08	30.00	0.11
8	30.00	76	69.5	83	74	66.0	68	ne.	3-1	3-2	30.06	29.98	0.01
9	29.97	76	69	83	74	66.0	68	ne.	1-3	1-3	30.03	29.95	T.
10	30.00	77	69	84	75	64.5	62	ne.	1-3	1-2	30.04	29.95	0.00
11	30.00	77	70	84	75	65.3	64	ne.	1-3	2	30.04	29.96	T.
12	29.97	75	69	84	75	67.5	74	ne.	1-2	3-10	30.05	29.96	0.00
13	29.94	75	71	83	72	66.5	71	ne.	2-0	4-2	29.98	29.91	0.22
14	29.95	75	69	84	71	67.3	72	nne.-ne.	0-2	1-4	29.97	29.90	0.02
15	29.96	76	68	84	70	65.3	66	ne.	1-2	1-8-4	30.00	29.94	T.
16	29.96	75	68	83	75	63.7	62	nne.	1-2	3	30.00	29.94	0.00
17	29.96	75	69	83	72	64.3	66	ne.	2-3	3	30.00	29.91	0.03
18	29.98	75	69.5	82	72	65.0	67	ne.	4-5	4-2	30.02	29.94	0.22
19	30.01	76	69.5	83	72	66.3	70	ne.	3-4	1-3	30.05	29.97	0.09
20	30.03	76	69	83	74	66.7	71	ne.	3	3	30.05	29.98	0.03
21	30.00	76	69.5	83	75	65.3	67	ne.	1-3	1-8-0	30.05	29.97	0.00
22	29.99	73	68.5	84	73	66.3	68	ne.	1-3-1	1-6-1	30.03	29.96	0.00
23	29.99	75	69	83	69	65.5	71	ne.	1-2	4	30.01	29.95	T.
24	30.01	72	70	84	72	67.7	75	ne.	2-0	1-10	30.04	29.97	0.03
25	30.00	76	70.5	83	69	68.7	75	ne.	1-2	1	30.04	29.96	2.32
26	29.99	75	68	81	73	68.3	75	ne.	1-3	1-3	30.02	29.95	0.04
27	29.98	75	69	82	74	65.7	72	ne.	3-1	3	30.00	29.94	0.07
28	30.03	74	70	82	71	66.7	74	ne.	1-4	3	30.04	29.95	0.29
29	29.98	74	70.5	81	71	68.3	79	ne.	4-1	6-9-4	30.02	29.96	0.75
30	29.99	76	69.5	83	71	68.5	76	ne.-ene.	1-3	3-10	30.03	29.94	1.07
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.75
Means	29.991	75.0	69.2	83.0	72.5	66.1	69.7	.....	2.3	3.4	30.030	29.954	.....
Departure	+.023	.....	.....	.....	.....	+0.1	+1.2	.....	.....	−0.6	.....	.....	+3.76

Mean temperature for the month of September, 1903, (6 + 2 + 9) ÷ 3 = 77.5°; normal is 77.3°. Mean pressure for the month of September, 1903, (9 + 3) ÷ 2 = 29.991; normal is 29.968.

* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 4.31 p. m., Greenwich time. ‡ These values are the means of (6 + 9 + 2 + 9) ÷ 4. § Beaufort scale.

Maximum thermometer set at 9 p. m. and minimum at 2 p. m., local time.

The artesian well water level fell during the month from 33.30 to 33.10 feet above mean sea level; September 30, 1902, it stood at 32.95. The average daily mean sea level for the month was 9.64 feet, the assumed annual mean being 10.00 feet above datum; for September, 1902, it was 9.72.

Trade wind days, 30, (two of nne.); normal, 26; average force of wind during daylight, Beaufort scale, 2.3; average cloudiness, tenths of sky, 3.4; normal, 4.0.

Approximate percentages of district rainfall as compared with normal: Hawaii, Hilo district, 158 per cent; Hamakua, 118; Kohala, 108; Waimea, 115; Kona, 113; Kau, 67; Puna, 152; Island of Maui, 330, except at Haleakala ranch, 838 per

cent; Oahu, variable, from 74 at Kahuku to 500 at Kapiolani Park; Kauai, 135 per cent.

The heaviest 24-hour rainfalls for the month were at Kaumana, Hawaii, 6.91 (29th); Eleele, Kauai, 6.22 (29th); and West Lawai, Kauai, 5.90 (30th). The heaviest monthly rainfall reported was at Wahiawa Mountain, Kauai, 23.50 inches.

Kohala, dew-point, 67.1°; relative humidity, 78.8 per cent; trade wind days, 30.

United States Magnetic Station, dew-point, 66.0°; relative humidity, 69.0 per cent.

There has been a marked absence of southerly winds during the past four months, but two days with wind from that direction since the first of June, and while southerly winds are rare during these months, this is an unusual record.

The heavy rainfall of the early evening of the 23d (2.32 inches falling at the Weather Bureau in three hours) was local and confined to Honolulu and vicinity. This downpour was more in the nature of a cloudburst than on ordinary rainfall, it was preceded by very clear weather, followed in the late afternoon by a rapid clouding over and a sudden torrential downpour lasting for three hours, when it ceased almost as suddenly as it began leaving a clear starlit sky.

Thunder and lightning accompanied the rainfall at Honolulu on the evening of the 28th. The precipitation of the last three days of the month extended over the whole group.

Bright afterglow at Honolulu 14th to 18th, inclusive, and brilliant sheet lightning in the south on the evening of the 29th.

Pepeekeo, Hawaii, reports lightning on the 27th, and frequent thunder on the 28th; heavy surf 7th to 9th, inclusive, 14th, 15th, 27th, and 28th.

Waimea, Hawaii, fine glow all the month; snowing on Mauna Loa and Mauna Kea 28th, and mountains heavily capped on 29th; fresh and strong trade winds, with gale 10th and 11th.

Hilo reports earthquake on the 1st at 7:16 p. m.; thunder and lightning 28th.

CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of Mr. H. H. Cousins, chemist to the government of Jamaica and now in charge of the meteorological service of that island, we have received the following table in advance of the regular monthly weather report for Jamaica:

Comparative table of rainfall for September, 1903.

[Based upon the average stations only.]

Divisions.	Relative area.	Number of stations.	Rainfall.	
			1903.	Average.
	Per cent.		*Inches.*	*Inches.*
Northeastern division	25	25	4.80	8.15
Northern division	22	52	4.30	5.14
West-central division	26	25	8.07	8.97
Southern division	27	35	4.20	6.42
Means	100	137	5.34	7.17

The rainfall for September was therefore below the average for the whole island. The greatest rainfall, 21.83 inches, occurred at Spring Valley, in the southern division, while 0.43 inch fell at Plumb Point L. H. and at Port Royal Naval Hospital in the same division.

COSTA RICAN CLIMATOLOGICAL DATA.

Communicated by Mr. H. PITTIER, Director, Physico-Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San José de Costa Rica, during September, 1903.*

Hours.	Pressure. Observed, 1903.	Pressure. Normal, 1889–1900.	Temperature. Observed, 1903.	Temperature. Normal, 1889–1900.	Relative humidity. Observed, 1903.	Relative humidity. Normal, 1889–1900.	Rainfall. Observed, 1903.	Rainfall. Normal, 1889–1900.	Rainfall. Duration, 1903.
	Inches.	*Inches.*	° F.	° F.	%	%	*Ins.*	*Ins.*	*Hrs.*
1 a. m	26.17	26.13	62.4	63.4	93	94	0.01	0.02	0.33
2 a. m	26.16	26.12	62.0	63.0	92	94	0.01	0.02	0.17
3 a. m	26.14	26.10	61.9	62.6	91	94	0.01	0.02	0.50
4 a. m	26.13	26.10	61.3	62.3	91	94	......	0.01	......
5 a. m	26.13	26.10	60.8	62.2	91	94	......	0.01	......
6 a. m	26.14	26.11	60.4	61.8	91	94	......	0.01	......
7 a. m	26.15	26.13	60.9	62.1	89	92	......	T.	......
8 a. m	26.16	26.14	65.4	66.7	80	85	......	0.00	......
9 a. m	26.18	26.15	69.6	69.4	69	77	......	T.	......
10 a. m	26.18	26.15	73.6	73.8	65	71	......	0.00	......
11 a. m	26.18	26.15	75.6	75.8	60	68	......	0.02	......
Noon	26.17	26.14	77.3	77.0	59	69	0.02	0.13	0.50
1 p. m	26.15	26.11	77.2	76.9	64	69	0.07	0.64	1.33
2 p. m	26.13	26.10	77.4	75.6	62	73	0.77	1.06	2.00
3 p. m	26.11	26.08	74.8	73.6	69	78	0.35	1.14	3.50
4 p. m	26.10	26.08	72.1	71.1	78	83	1.47	2.34	6.84
5 p. m	26.11	26.08	69.6	68.9	82	86	1.84	2.13	7.34
6 p. m	26.12	26.09	67.8	67.7	87	90	1.62	1.70	7.83
7 p. m	26.14	26.11	66.6	66.4	87	92	1.07	1.39	8.67
8 p. m	26.16	26.13	65.6	65.7	91	92	1.91	0.79	10.17
9 p. m	26.17	26.14	65.0	65.0	91	93	0.35	0.50	7.50
10 p. m	26.18	26.15	64.3	64.5	93	92	0.19	0.21	3.83
11 p. m	26.19	26.15	63.9	64.1	91	92	0.12	0.11	3.00
Midnight	26.19	26.15	63.0	63.8	93	93	0.02	0.04	2.00
Mean	26.15	26.12	67.4	67.6	81	86	......	......	......
Minimum	26.07	25.97	55.0	55.9	33	......	......	......	......
Maximum	26.22	26.23	84.7	86.0	100	......	......	......	......
Total	......	......	......	......	......	......	9.83	12.29	65.51

REMARKS.—At San José the barometer is 1169 meters above sea level. Readings are corrected for gravity, temperature, and instrumental error. The hourly readings for pressure, and wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The thermometers are 1.5 meters above ground and are corrected for instrumental errors. The total hourly rainfall is as given by Hottinger's self-register, checked once a day. Under maximum, the greatest hourly rainfall for the month is given. The standard rain gage is 1.5 meters above ground. Since January 1, 1902, observations at San José have been made on seventy-fifth meridian time, which is 0 hours, 36 minutes, 13.3 seconds *in advance* of San José local time. The normals for pressure, temperature, and relative humidity have been adjusted to this time; the normal for rainfall in Table 1 and the sunshine observations and normal in Table 2 refer to local time. At Port Limon the hours of direct observation are 8 a. m., 2 and 8 p. m., San José local time; the barometer is 3.4 meters above sea level. The means for temperature and relative humidity in Table 4 are obtained from two-hourly readings given by a Richard self-registering thermometer.

TABLE 2.—*San José, September, 1903.*

Time.	Sunshine. Observed, 1903.	Sunshine. Normal, 1889–1900.	Cloudiness. Observed, 1903.	Cloudiness. Normal, 1889–1900.	Temperature of the soil at depth of— 6 inches.	12 inches.	24 inches.	48 inches.	120 inches.
	Hours.	*Hours.*	%	%	° F.	° F.	° F.	° F.	° F.
7 a. m	12.08	9.36	52	54	69.7	70.3	71.2	70.7	70.5
8 a. m	23.85	20.35	......	......	......	......	......	......	......
9 a. m	24.92	22.20	......	......	......	......	......	......	......
10 a. m	25.38	22.07	68	61	69.8	70.1	71.2	70.9	......
11 a. m	21.98	20.07	......	......	......	......	......	......	......
Noon	18.82	16.40	......	......	......	......	......	......	......
1 p. m	16.24	12.48	82	83	70.7	70.5	71.2	70.9	......
2 p. m	15.22	11.75	......	......	......	......	......	......	......
3 p. m	13.46	8.65	......	......	......	......	......	......	......
4 p. m	8.74	4.50	92	94	71.2	70.8	71.2	70.8	......
5 p. m	5.44	2.08	......	......	......	......	......	......	......
6 p. m	1.42	0.51	......	......	......	......	......	......	......
7 p. m	......	......	87	92	71.2	70.9	71.3	70.7	......
8 p. m	......	......	......	......	......	......	......	......	......
9 p. m	......	......	......	......	......	......	......	......	......
10 p. m	......	......	66	77	71.5	70.9	71.3	70.7	......
11 p. m	......	......	......	......	......	......	......	......	......
Midnight	......	......	......	......	......	......	......	......	......
Mean	......	......	74	77	70.6	70.6	71.3	70.6	70.5
Total	187.55	150.42							

TABLE 3.—*Rainfall at stations in Costa Rica, September, 1903.*

Stations.	Height above sea level.	Observed, 1903. Amount.	Observed, 1903. Number of days.	Averages. Number of years.	Averages. Amount.	Averages. Number of days.
	Feet.	*Inches.*			*Inches.*	
Sipurio (Talamanca)	60	......	......	3	11.69	18
Boca Banano	3	1.34	13	7	5.00	15
Port Limon	3	1.02	......	9	5.28	10
Swamp Mouth	3	3.86	14	5	5.67	10
Zent	20	2.64	10	2	5.00	13
Siquirres	60	1.06	9	5	5.39	12
Dos Novillos	122	......	......	......	......	......
Guapiles	300	13.27	15	3	16.34	14
Caribianco (Sarapiqui)	835	5.79	25	5	15.90	25
San Carlos	161	12.28	19	5	11.06	22
Las Lomas	266	0.87	4?	3	7.13	11
Peralta	332	10.67	17	5	10.08	18
Turrialba	620	1.46	7	8	9.57	17
Juan Viñas	1,040	2.91	16	7	5.94	12
Santiago	1,100	6.57	18	2	5.60	21
Paraiso	1,336	3.98	7	2	9.41	18
Cachi	1,020	4.17	7	2	7.36	28
Las Concavas	1,337	6.69	23	2	8.50	20
Cartago	1,451	6.89	17	3	6.18	18
Tres Rios	1,300	10.43	17	13	8.86	20
San Francisco Guadalupe	1,187	3.90	12	7	11.38	22
San José	1,160	9.83	19	14	12.44	24
La Verbena	1,140	12.60	23	7	11.50	21
Nuestro Amo	791	9.06	14	7	9.13	20
Alajuela	950	15.51	22	3	9.69	21
San Isidro Alajuela	1,346	18.39	24	2	25.55	22
Las Cañas	780	13.23	16	......	......	......

TABLE 4.—*Observations taken at Port Limon and Zent, September, 1903.*

Stations.	Pressure. Minimum.	Pressure. Maximum.	Pressure. Mean.	Temperature. Minimum.	Temperature. Maximum.	Temperature. Mean.	Relative humidity.
	Inches.	*Inches.*	*Inches.*	° F.	° F.	° F.	%
Port Limon	......	......	......	......	......	......	......
Zent	......	......	......	65.5	90.1	82.2	83

Stations.	Cloudiness.	Sunshine.	Rainfall. Amount.	Rainfall. Number of days.	Temperature of soil at depth of— 6 inches.	12 inches.	24 inches.
	%	*Hours.*	*Inches.*		° F.	° F.	° F.
Port Limon	......	......	1.02	......	......	......	......
Zent	72	165.43	2.64	10	82.4	81.3	81.1

MEXICAN CLIMATOLOGICAL DATA.

By Señor MANUEL E. PASTRANA, Director of the Central Meteorologic-Magnetic Observatory.

September, 1903.

Stations.	Altitude.	Mean barometer.*	Temperature. Max.	Temperature. Min.	Temperature. Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Prevailing direction. Cloud.
	Feet.	*Inches.*	° F.	° F.	° F.	%	*Ins.*		
Chihuahua	4,684	25.24	86.7	50.4	73.6	47	3.71	ne.	......
Guadalajara (Obs. del Est.)	5,186	24.92	80.6	59.0	68.4	77	5.47	ene.	......
Guanajuato	6,640	......	......	......	......	......	......	......	......
Leon (Guanajuato)	5,906	24.27	81.3	52.9	67.1	70	3.38	wsw.	......
Mazatlan	25	29.84	91.9	69.8	82.8	77	8.40	nw.	......
Merida	50	29.90	96.8	62.1	81.7	74	1.29	ne.	......
Mexico (Obs. Cent.)	7,472	23.06	75.7	51.1	61.5	71	2.00	nw.	e.
Mexico (E. N. Agric.)	7,442	......	......	......	......	......	......	......	......
Monterey (Seminario)	1,626	......	......	......	......	......	......	......	......
Morelia (Seminario)	6,401	23.92	74.3	51.8	61.5	79	3.27	s.	......
Pachuca	7,959	......	......	......	......	......	......	......	......
Puebla (Col. Cath.)	7,108	23.38	75.7	45.1	60.1	82	5.82	ne.	......
Puebla (Col. d Est.)	7,118	23.34	75.4	46.4	60.6	77	5.93	e.	......
Queretaro	6,070	......	......	......	......	......	......	......	......
Toluca	8,812	......	......	......	......	......	......	......	......
Zacatecas	8,015	22.56	77.0	44.6	59.5	70	2.16	e.	......
Zapotlan	5,078	25.06	81.5	64.4	68.4	76	6.50	sse.	......

*The monthly barometric means are reduced to the international standard of gravity.

Chart I. Tracks of Centers of High Areas. September, 1903.

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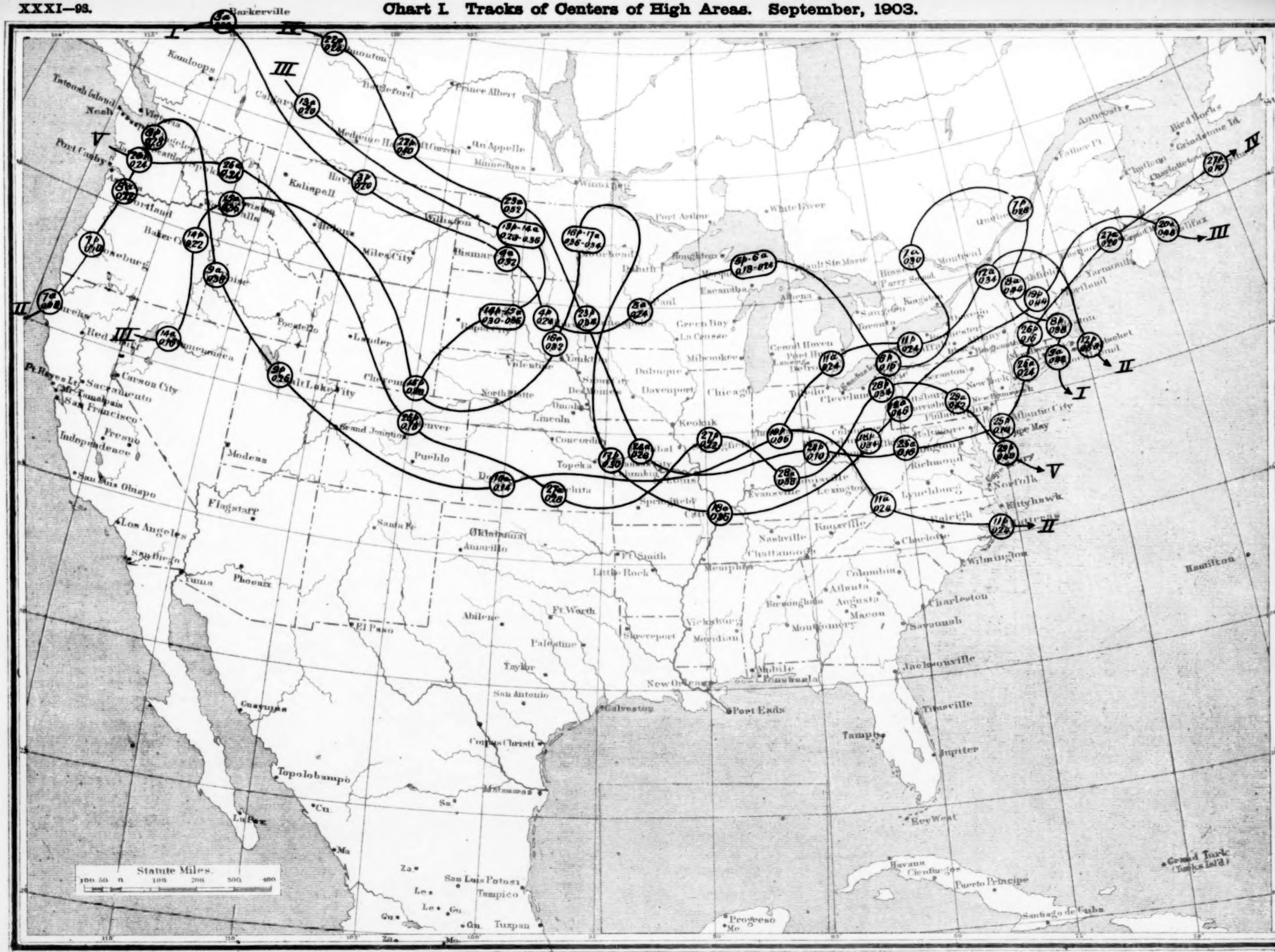
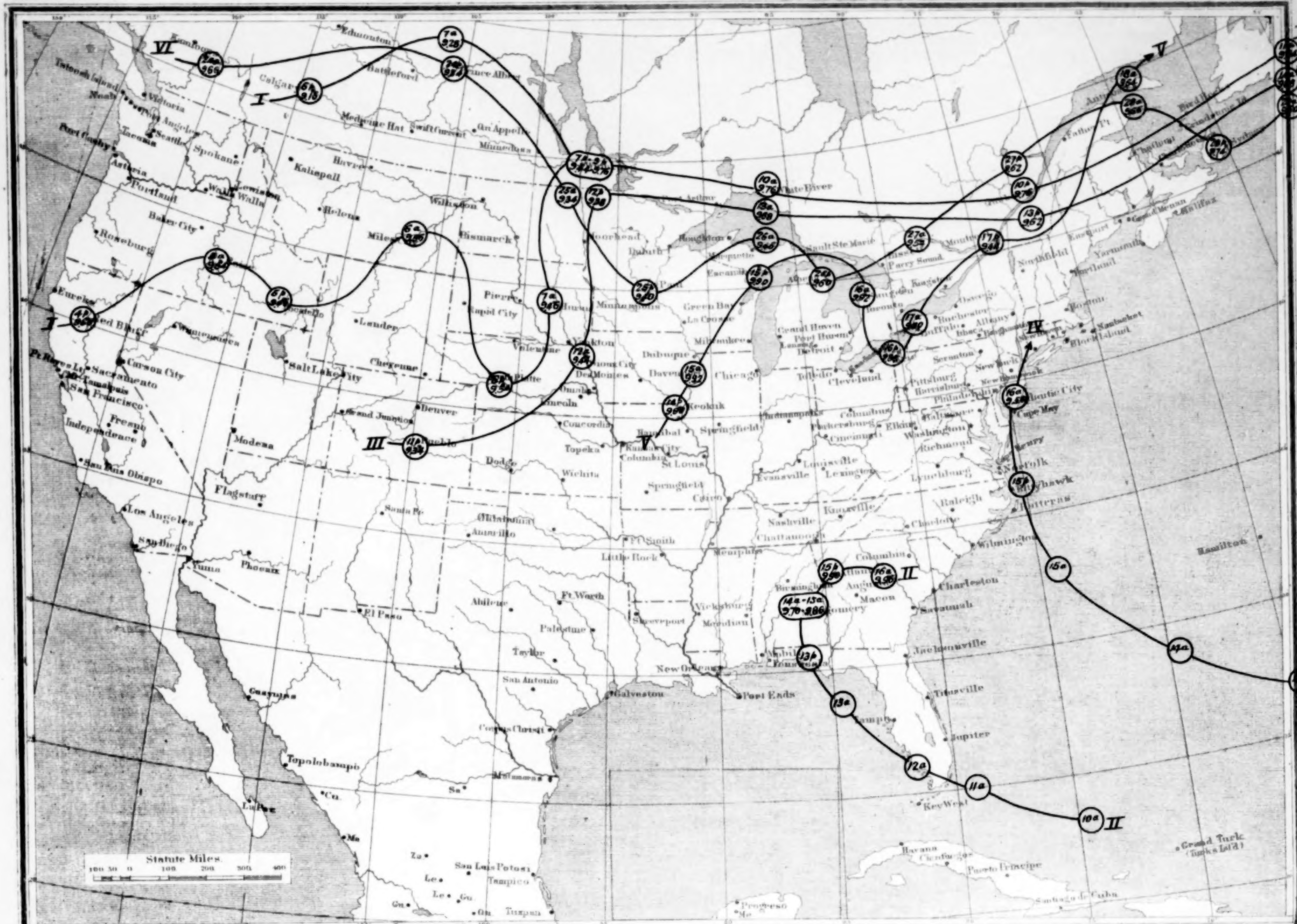


• Barkerville

Chart II. Tracks of Centers of Low Areas. September, 1903.



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XXXI—95. • Barkerville Chart III. Total Precipitation. September, 1903.

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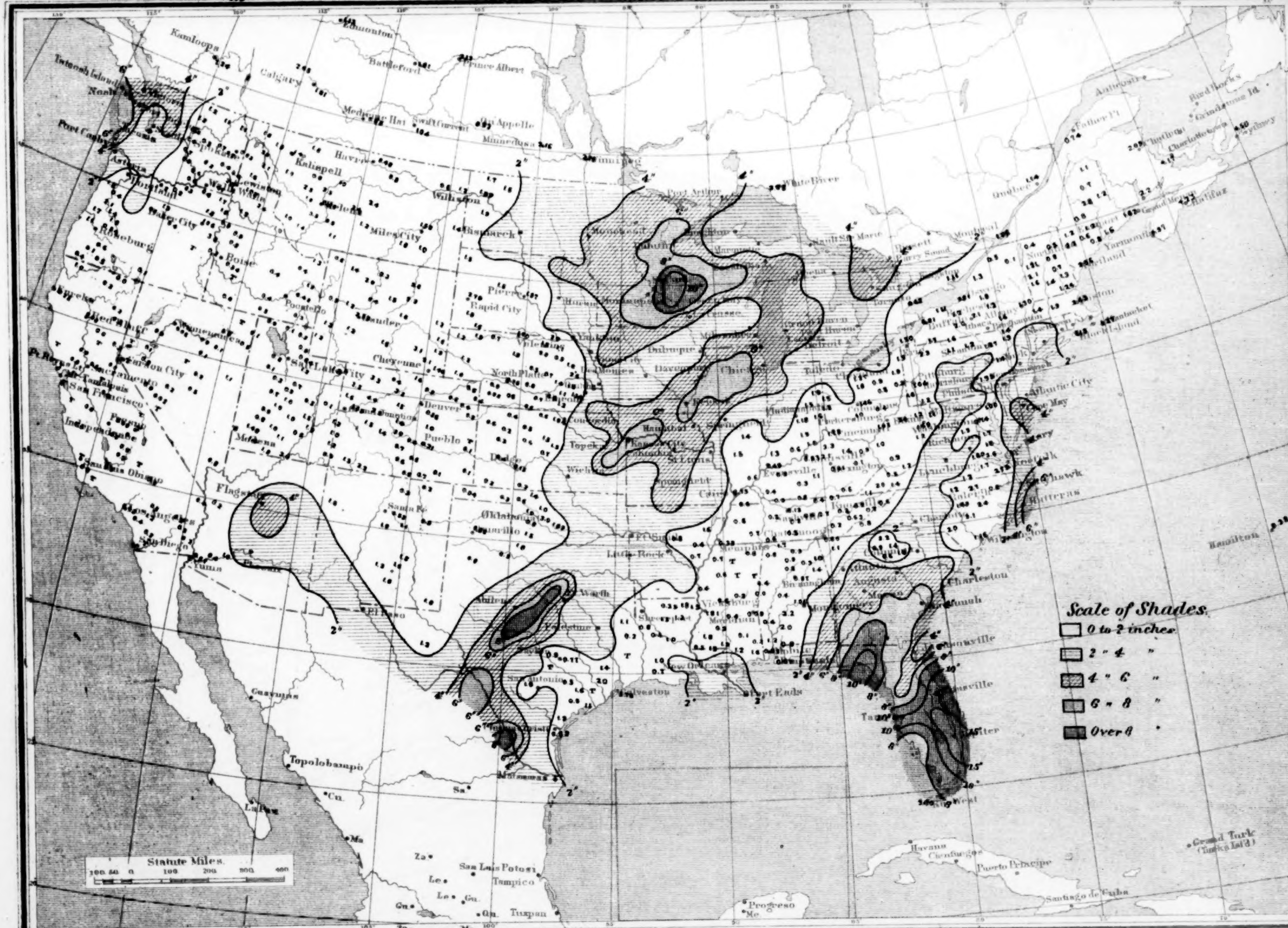
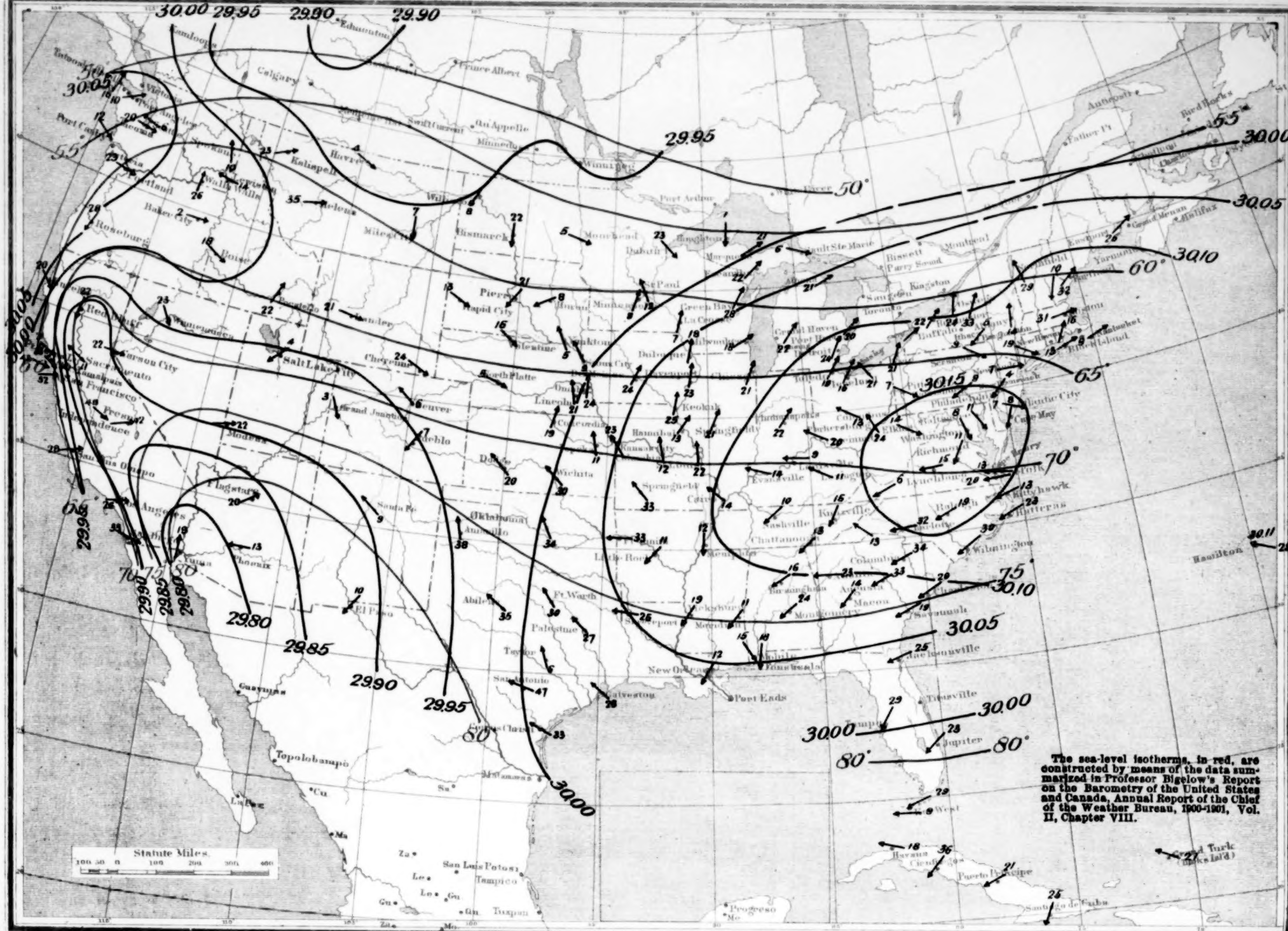


• Barkerville **Chart IV. Sea-Level Pressure and Temperature; Resultant Surface Winds. September, 1903.**



The sea-level isotherms, in red, are constructed by means of the data summarized in Professor Bigelow's Report on the Barometry of the United States and Canada, Annual Report of the Chief of the Weather Bureau, 1900-1901, Vol. II, Chapter VIII.

Chart V. Hydrographs for Seven Principal Rivers of the United States. September, 1903.

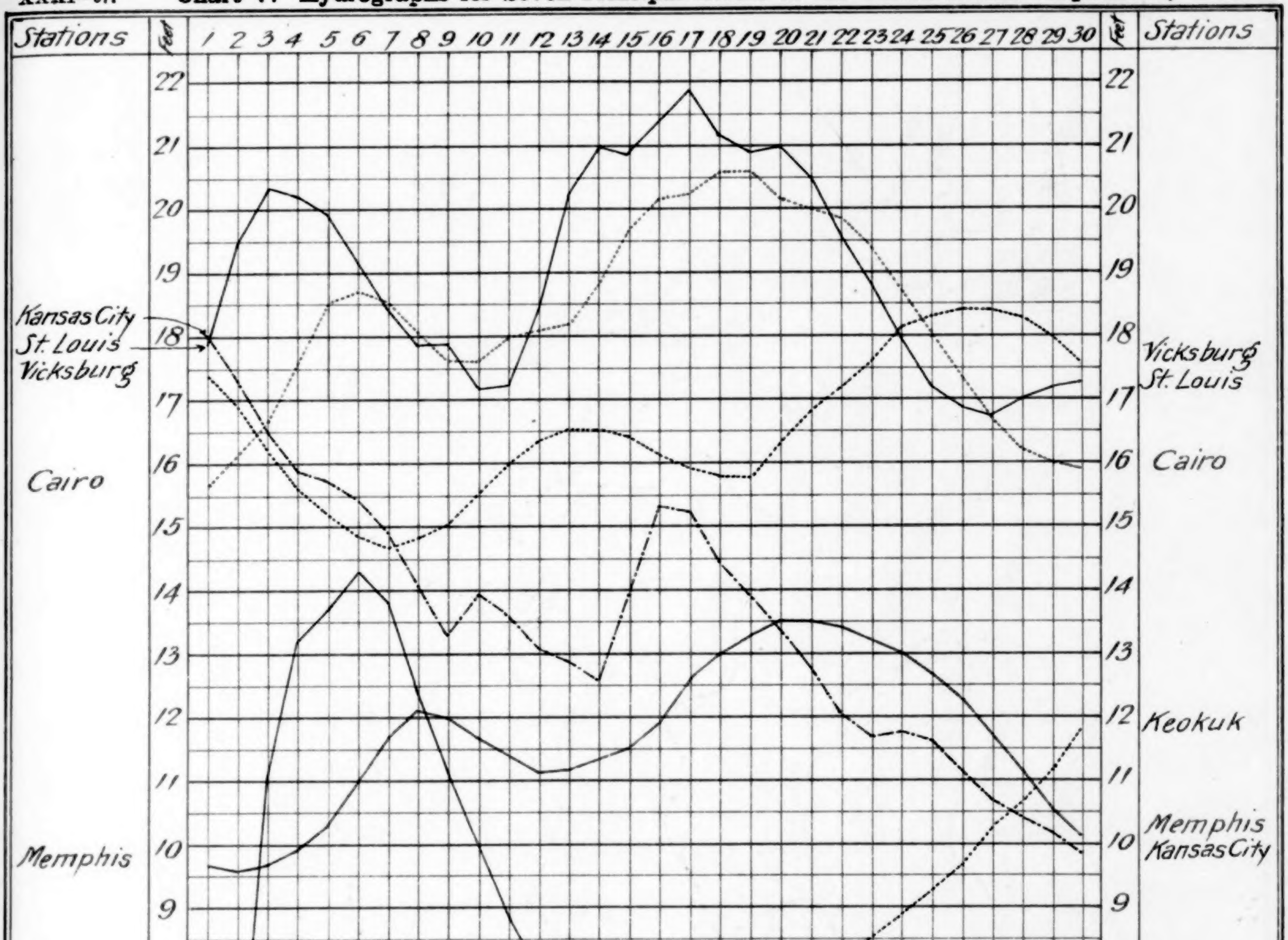


Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. September, 1903.

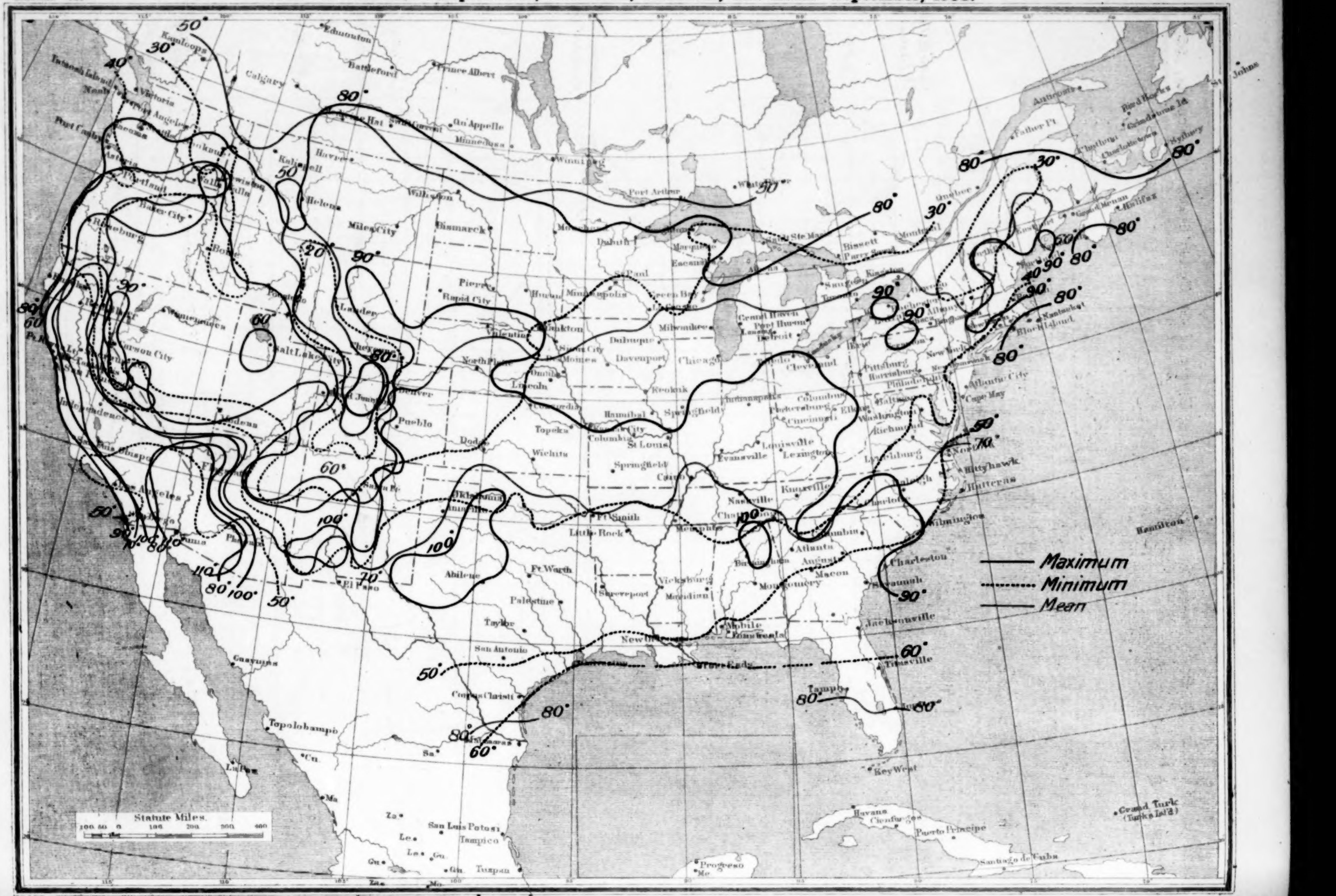


Chart VII. Percentage of Sunshine. September, 1903.

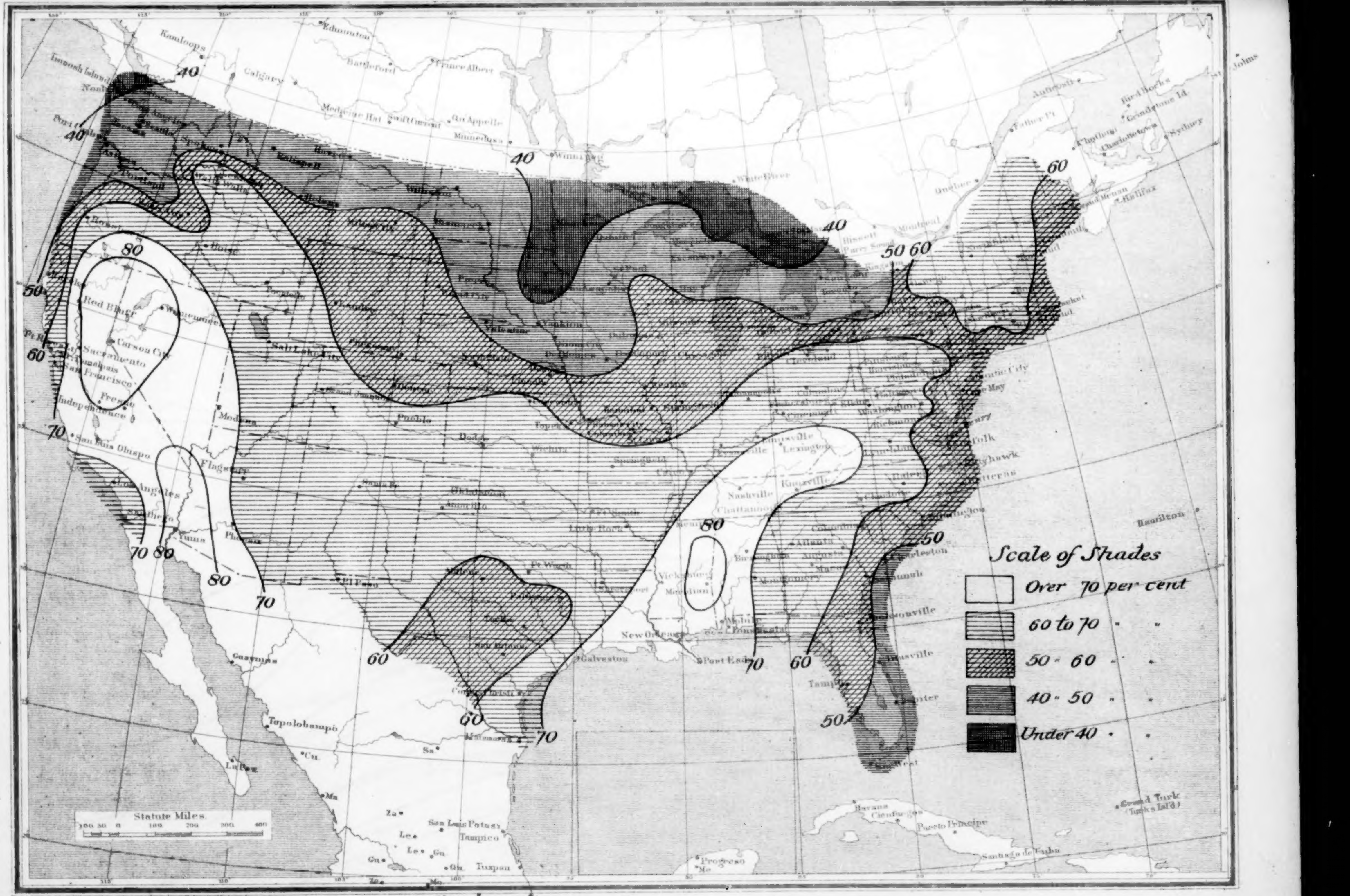


Chart VIII. Isobars and Isotherms at 10,000 feet. September, 1903.

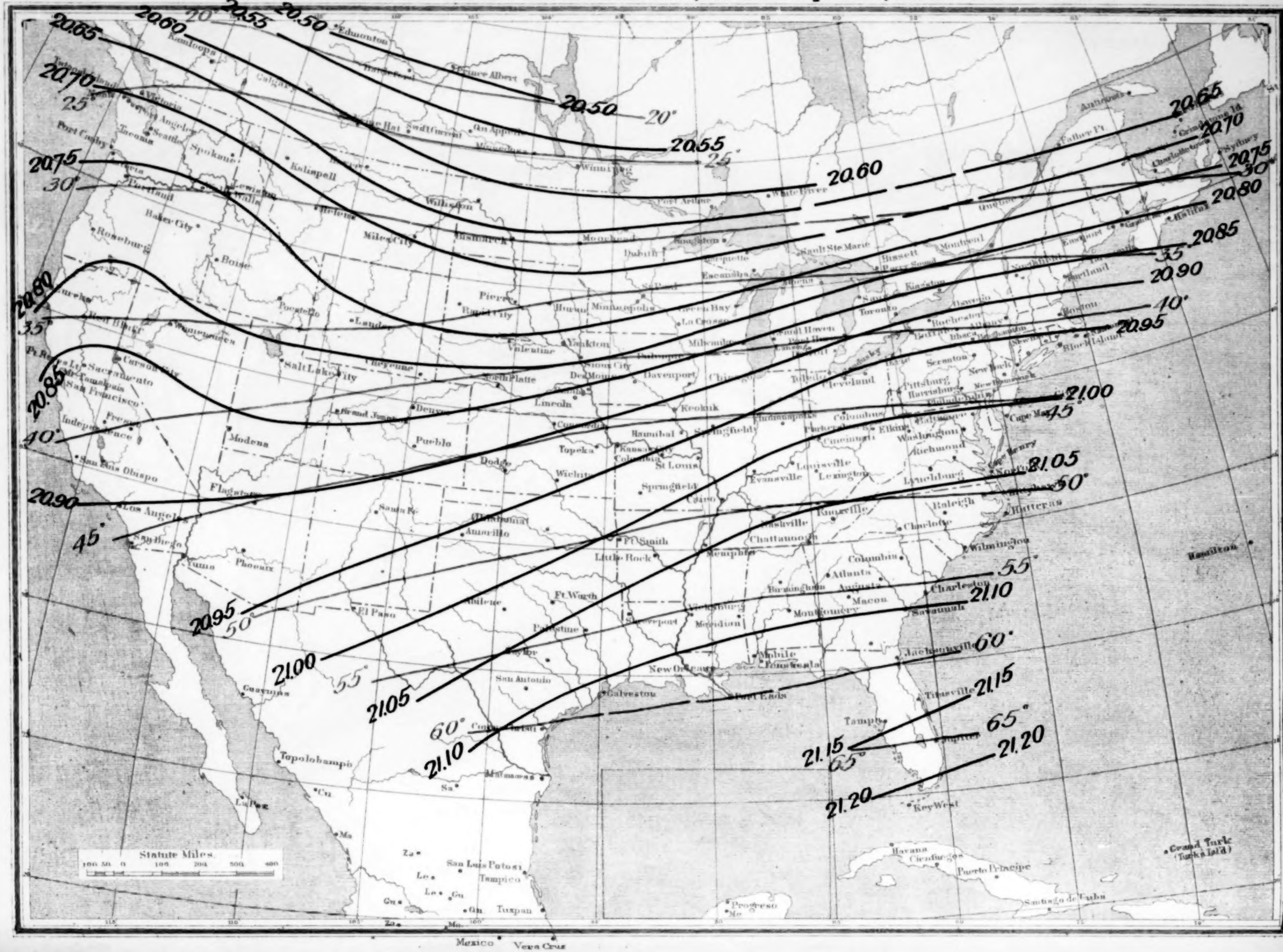


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Chart IX. Isobars and Isotherms at 3,500 feet. September, 1903.

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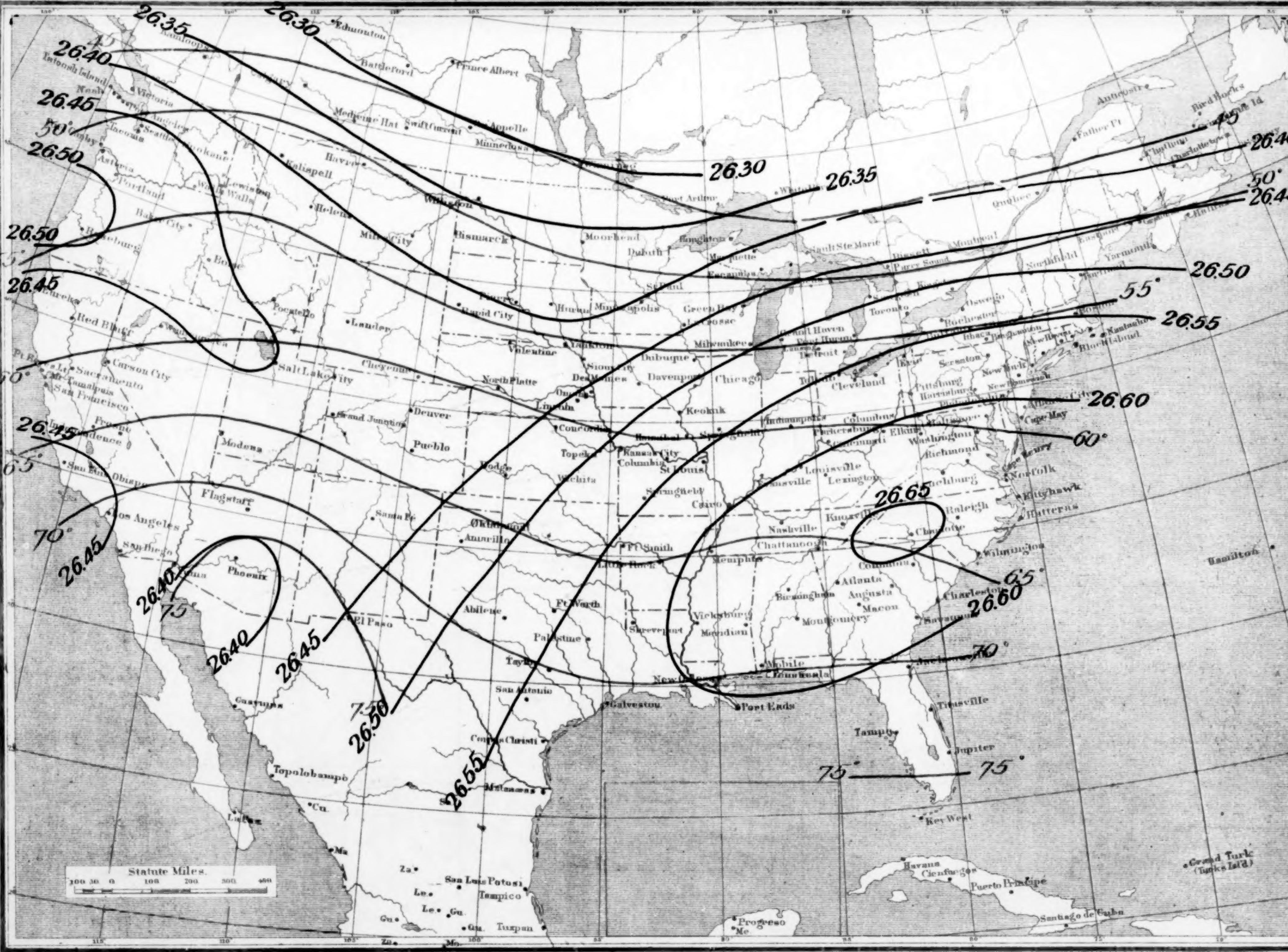

Chart X. West Indian Monthly Isobars, Isotherms, and Resultant Winds, September, 1903.